

LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA16-22 | Ladbroke to Handsacre

**Ecological baseline data: designated sites,
habitat surveys and flora (EC-001-003)**

Ecology

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Department
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Appendix EC-001-003

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1 Introduction

1.1.1 This document is an appendix which forms part of Volume 5 of the Environmental Statement (ES) for the Proposed Scheme. It details ecological baseline data collected for the following community forum area (CFA):

- CFA16: Ladbroke and Southam;
- CFA17: Offchurch and Cubbington;
- CFA18: Stoneleigh, Kenilworth and Burton Green;
- CFA19: Coleshill Junction;
- CFA20: Curdworth to Middleton;
- CFA21: Drayton Bassett, Hints and Weeford; and
- CFA22: Whittington to Handsacre.

1.1.2 The document should be read in conjunction with Volume 2 (Community forum area reports), Volume 3 (Route wide effects) and Volume 4 (Off-route effects).

2 Designated sites

2.1 Introduction

- 2.1.1 This section of the appendix presents details of sites designated on the basis of their importance for nature conservation which fall within the scope of the ecological assessment for the section of the Proposed Scheme that will pass through CFA16 to CFA22 inclusive.

2.2 Methodology

- 2.2.1 Data searches were initially undertaken to identify designated sites within the following extents as defined in the Scope and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1):
- statutory designated sites within 10km of the route (i.e. a 10km buffer either side of the centre-line of the route within this area); and
 - non-statutory designated sites within 5km of the route (i.e. a 5km buffer either side of the track centre-line).
- 2.2.2 Information on designated sites was obtained from the following data sources:
- Natural England;
 - Warwickshire Biological Records Centre;
 - Staffordshire Ecological Record; and
 - Staffordshire Wildlife Trust.
- 2.2.3 All sites within the extents defined within the SMR for this area of the route were then reviewed to identify those that were considered likely to be relevant to the assessment. Due to the large scale of the Proposed Scheme only details of those sites meeting the following criteria are presented within the following baseline section:
- all statutory designated sites within a 500m radius of the route of the Proposed Scheme;
 - any other statutory designated sites which are considered potentially subject to significant effects;
 - all non-statutory designated sites within the extent or adjacent to the land required for construction of the Proposed Scheme; and
 - any other non-statutory designated sites which are considered potentially subject to significant effects.

2.3 Baseline

- 2.3.1 Table 1 provides details of statutory designated sites relevant to the assessment, based on the criteria identified in Section 2.2.3.

Table 1: Statutory designated sites within CFA16 to CFA22 inclusive

Site name and designation	Ordnance survey (OS) grid reference	Site description	Distance from the land required for construction of the Proposed Scheme ¹ (m) and orientation	Relevant CFA number
Long Itchington and Ufton woods Site of Special Scientific Interest (SSSI)	SP 388 627	<p>The site comprises 79.32ha of oak-hazel coppice woodland which is traditionally managed. The woodland has a species-rich shrub layer and is situated on poorly drained clay soils overlying a 'White Lias' limestone ridge. The rich soil and ground flora support a diverse species composition.</p> <p>The woodland is important for many breeding birds, such as warblers (<i>Sylviidae</i> family), stock dove (<i>Columba oenas</i>), nuthatch (<i>Sitta europaea</i>), woodpeckers (<i>Picidae</i> family). Tawny owl (<i>Strix aluco</i>) and woodcock (<i>Scolopax rusticola</i>) are also known to breed in the wood.</p>	The Proposed Scheme will pass below this SSSI in tunnel.	CFA16
Kenilworth Common Local Nature Reserve (LNR) ²	SP 296 730	The common, which was once open heathland, is all that remains of the once extensive Odybarn Heath which was largely enclosed during the 18th century, and now consists of acidic Oak-Birch (<i>Betula</i> sp.) woodland.	560m	CFA18
Wainbody Wood and Stivichall Common, Kenilworth Road Spinney LNR	SP 313 752	A large combined area of mature semi-natural woodland (partly ancient) of exceptional beauty and moderate social value. Designated partly on the basis of the high nature conservation value attached to old woodland.	Adjacent to land required	CFA18
Crackley Wood LNR	SP291744	Deciduous, mixed and coniferous woodland, pond, stream, ditch, marsh and disused railway.	90m	CFA18
Middleton Pool SSSI, Middleton Pool LNR	SP190983	This 12.6ha site is an artificial lake that was dug and landscaped in the 16th century and is fed by the Langley Brook. Extraction of gravel in the Tame Valley has resulted in a chain of water bodies which are important for migrating waterfowl. Despite its small size, this site supports 46 species of breeding birds.	Adjacent to land required	CFA20
Whiteacre Heath SSSI, and Whiteacre Heath LNR	SP 208928	<p>Contain a chain of water bodies within the floodplain of the River Tame, created by gravel extraction that is now important for their wetland breeding birds.</p> <p>The disused gravel workings show a succession of vegetation from open water, through sedges, reedmace and common reed to willow carr and birch scrub. Adjoining the old gravel workings are wet meadows which flood regularly and attract wintering and migrant birds.</p>	40m	CFA20

¹ Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'. Distances are rounded to the nearest 10m.

² Kenilworth Common Local Nature Reserve (LNR) is just over 500m from the land required for construction of the Proposed Scheme. However, this site is mentioned within the section on reptiles and is therefore included here.

2.3.2 Additional survey information for Long Itchington and Ufton Woods SSSI was received from the Land Management Advisor of Natural England³. The survey information indicated that there are two types of woodland within the SSSI; on the higher slopes to the south the woodland is predominantly pedunculate oak – ash – hazel woodland on damp heavy soils. On the higher ground the understory and field layer is dominated by bramble and tufted hair grass with abundant rush and sedge species. The lower northern slopes of the woodland support an uncommon form of calcareous ash – wych elm woodland on heavy soils

2.3.3 Information on the SSSI was also received verbally from the Land Management Advisor of Natural England during a site meeting on 07 May 2013. A summary of this information is given below:

- Long Itchington Wood is notified for its woodland community with ash on scarp and oak at higher elevation. The wood used to be under the ownership of the Stoneythorpe Estate and was actively coppiced. Approximately 10 years ago the ownership changed and coppicing ceased, although there have been some recent attempts at replanting in 1ha coups near the southern section of the wood;
- the last survey was undertaken in the 1980s which included a Phase 1 habitat survey (data received from Natural England). No detailed botanical surveys have been undertaken; and
- there is a sinuous medieval 'wood bank' on the northern edge of the wood and could be some veteran trees in this area. Natural England's position on planting adjacent to the woodland previously had been not to extend the wood as it would mask the medieval wood bank which may be an issue to the banks heritage setting.

2.3.4 Any additional relevant information on habitats or animal populations within these designated sites is given in the relevant species section.

Non-statutory designated sites

2.3.5 A set of criteria, and guidelines for Local Wildlife Site (LWS) selection, have been formulated in Warwickshire. Wildlife sites are part of the overall Sites of Importance for Nature Conservation (SINC) system for Warwickshire which include Regionally Important Geological Sites (RIGS) (discussed in Volume 2, Section 8). The small proportion of Warwickshire covered by statutory designations means that LWS are of prime importance for the conservation of biodiversity in Warwickshire⁴.

2.3.6 Local wildlife sites in Staffordshire are called Sites of Biological Importance (SBI) and Biodiversity Alert Sites (BAS). SBI are generally the best remaining examples within Staffordshire of habitats which rate highly on the basis of such factors as naturalness, diversity or rarity of species or communities. These sites are frequently the remnants of larger areas of semi-natural vegetation, which may not be either sufficiently extensive or undisturbed to warrant SSSI status but are important examples of characteristic or notable vegetation types or habitat complexes (sometimes with

³ Phase 1 habitat survey data sheets and map for Long Itchington and Ufton Wood, dated 1983.

⁴ Guidance for the selection of non-statutory SINC in Warwickshire (Warwickshire Wildlife Sites Project, 1998).

associated dependent plant or animal species). As such, they contribute the most significant element in the county's nature conservation resources⁵.

- 2.3.7 BAS are of lower intrinsic quality, smaller size or have suffered damage or disturbance. Nevertheless, they collectively form a significant part of Staffordshire's nature conservation resource, and, in some cases, a valuable reserve series for some of the SBI.
- 2.3.8 Both SBI and BAS contribute significantly to the maintenance of biodiversity in the wider countryside, are recognised as a major local and national objective and are considered to be of county/metropolitan value for the purposes of assessment.
- 2.3.9 Details for potential LWS (pLWS) and Ecosites were available from Warwickshire Biological Records Centre. Ecosites are sites where the Biological Record Centre has significant records and could be or include LWS and SSSI or other statutory sites. Neither pLWS nor Ecosites are formally designated and a list of these sites is not included. However the presence of these sites has been taken into account; for example, information on the location of pLWS was taken into account in the selection of sites for detailed survey.
- 2.3.10 Table 2 provides details of non-statutory designated sites relevant to the assessment, based on the criteria identified in Section 2.2.3.

⁵ Guidelines for the selection of Sites of County Biological Importance in Staffordshire, Staffordshire Wildlife Trust. February 2008, Version 4.02 (May 2011).

Table 2: Non-statutory designated sites relevant to the assessment of CFA16 to CFA22 inclusive

Site name and designation	OS grid reference	Site description	Distance from the land required for construction of the Proposed Scheme ⁶ (m) and orientation	Relevant CFA number
South Cubbington Wood LWS	SP351687	South Cubbington Wood is an ancient semi-natural woodland and an excellent example of traditional Warwickshire woodland. Historic records of breeding nightingale.	Within land required	CFA17
Waverley and Weston Woods LWS	SP354705	An ancient woodland which is part of the largest group of such habitats in the county. This LWS is of county importance for its breeding Red List BoCC species, including cuckoo, song thrush, spotted flycatcher and marsh tit. Lesser redpoll, siskin and crossbill may also occasionally breed (also in Stoneleigh, Kenilworth and Burton Green area CFA18)	Within land required	CFA17
River Avon and Tributaries LWS	SP268614	The river forms an artery through the Warwickshire countryside linking wetland and other wildlife habitats. This section of the river retains many natural features, including several islands remnant channels and abundant diverse bank side vegetation. There are various habitats associated with the river, including woodland, meadows, scrub and ruderal areas. Of particular interest are the numerous willow pollards and mature oak and ash which contain large amounts of standing dead wood and support large numbers of invertebrates, nesting birds and bats and invertebrates.	Crossed by the route of the Proposed Scheme	CFA18
Broadwells Wood LWS	SP280752	With 108 species of vascular plant the wood has a very diverse flora. Most of these are characteristic of lowland damp oak-birch woodland, and six are characteristic within the county of ancient woodland.	Within land required	CFA18
Black Waste Wood LWS	SP272760	Black Waste Wood was first mentioned in documents as 'Blakewaste' in 1542 when it was heathland. The woodland has 63 species of vascular plant. 60 of these species have a high relative abundance resulting in high diversity.	Within land required	CFA18
Big Poors and Little Poors Wood LWS	SP265755	Located at Burton Green, in a rural area of Solihull to the south-east of Balsall Common. It comprises two small blocks of W10 Oak-Bracken-Bramble Woodland (<i>Quercus robur-Pteridium aquilinum-Rubus fruticosus</i>).	Within land required	CFA18
Kenilworth Common LWS	SP296730	The common, which was once open heathland, is all that remains of the once extensive Odybarn Heath which was largely enclosed during the 18th century, and now consists of acidic Oak-Birch (<i>Betula</i> sp.) woodland.	560m	CFA18
Crackley Wood Nature Reserve LWS	SP289738	The site consists of a rectangular block of ancient semi-natural woodland in Kenilworth parish. The surrounding habitats consist of arable and improved grassland with several woodlands in proximity. The LWS has the same boundary as Crackley Wood LNR.	90m	CFA18

⁶ Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'. Distances are rounded to the nearest 10m.

Site name and designation	OS grid reference	Site description	Distance from the land required for construction of the Proposed Scheme ⁶ (m) and orientation	Relevant CFA number
Kenilworth Road Spinney and Wainbody Woods LWS	SP313752	A large combined area of mature semi-natural woodland (partly ancient) of exceptional beauty and moderate social value. Designated partly on the basis of the high nature conservation value attached to old woodland. Part of Wainbody Wood and Stivichall Common, Kenilworth Road Spinney LNR.	50m	CFA18
Beanit Farm Hedge LWS	SP256761	The LWS comprises a 0.75km long north-south stretch of hedgerow and associated ponds situated on Beanit Farm in Berkswell parish. The hedgerow is of ancient origin and stands on a substantial medieval wood bank and ditch.	Within land required	CFA18
Wheeley Moor Farm Meadows LWS	SP187879	Contains MG4 Meadow Foxtail-Great Burnet grassland community, which is now an internationally threatened type; once widespread in river valleys, it is now uncommon and declining in the county. The western meadow appears to have once been a damp flood meadow before it was ploughed. Since, it has returned to grassland and the general biodiversity has increased considerably. The scrubby borders of the meadows hold a variety of breeding birds including pheasant, common whitethroat, blackcap, chiffchaff, linnet and reed bunting. Invertebrates noted included banded demoiselles, cinnabar moths (a declining species), meadow brown and small skipper butterflies.	5m	CFA19
Coleshill Hall Farm LWS	SP191881	<p>The two small semi-improved pasture fields making up the LWS are surrounded on three sides by hedges and small streams. It lies in an historic landscape; a former grand avenue leading to the old hall (now demolished) abutting the site on the north-east which has been reduced to a footpath and is known as Hall Walk.</p> <p>The two fields are subjected to intensive horse grazing particularly in the northern half of the field where there are areas totally denuded of vegetation near the stables. The best field is the small western pasture which is subject to occasional winter flooding and here there is an area of species-rich marshy grassland situated in the southern half. The eastern field is much drier and here the most diverse areas of grassland survive on some of the eroded banks and platforms where the soils are shallow.</p>	Within land required	CFA19
Coleshill Park Belt LWS	SP213893	<p>The LWS comprises a 1km long belt of semi-natural woodland plus a smaller section of mixed plantation on the northern and north-western boundary banks of the once extensive early medieval Coleshill Park.</p> <p>The northern belt is known as 'The Belt' and the far southern end of the western belt is known as 'The Catmore'. These were in existence by then (1st Edition OS Map) having perhaps been planted in the 18th century as a shelter belt when the new hall was built. The rest of The Catmore may date from around 1873. The LWS also includes two long sections of green lane contiguous with the belt, including a mosaic of semi-natural grassland, tall herb and scrub, as well as boundary hedges.</p> <p>Currently the LWS is rather isolated in an island of arable fields bounded by the M6 motorway on the west side and the M42 motorway and M6 Toll Road to the east, with a link road to the north.</p>	Within land required	CFA19

Site name and designation	OS grid reference	Site description	Distance from the land required for construction of the Proposed Scheme ⁶ (m) and orientation	Relevant CFA number
Coleshill Sewage Works Grassland LWS	SP188914	<p>This site represents one of a series of floodplain grasslands and wetlands on this stretch of the River Tame which form a wildlife corridor leading from the Tame valley wetlands complex into the Birmingham urban area.</p> <p>Swamp communities are present on ditch lines in places and wet grassland species are present. Scrub is found in places along ditch lines, augmented by bands of fairly recent planting. There is no formal public access to the area but several footpaths are present and the site is used by local residents for dog walking. The site represents a rare fragment of relatively unmodified floodplain landscape at the edge of the urban area.</p>	Within land required	CFA19
Hams Hall Woodlands LWS	SP204927	The three woodlands are relatively old of which one section is classed as ancient semi-natural woodland. This collection of woodland has a reasonable range of species (138) typical of W10 and wet woodland.	Within land required	CFA20
North Wood LWS	SP190957	North Wood is a small damp ancient woodland situated on Middleton House Farm about 2.25km south-south-east of Middleton village. The wood contains a double medieval moated site in the northern appendage, which is designated a scheduled ancient monument.	Within land required	CFA20
Coneybury Wood, LWS	SP192974	The woodland is an ancient semi-natural woodland that at one time seems to have been replanted as a lime coppice but has now largely reverted to Valley Fen Woodland.	160m	CFA20
Dunton Wood LWS	SP195938	Dunton Wood is of ancient origin and consists of irregular shaped, deciduous sessile oak/birch woodland with rowan (<i>Sorbus aucuparia</i>), hawthorn (<i>Crataegus monogyna</i>) and American holly (<i>Ilex opaca</i>).	70m	CFA20
Black Brook Corridor: Black Brook Bridge to Heart of England Way	SK142036	A large area comprising a mix of many habitat types, none of which sustain great wildlife value in their own right, but which in combination provide a useful wildlife refuge.	Within land required	CFA21
Bourne Brook Corridor, Botley House to Bourne Bridge BAS	SK158025	Predominantly semi-improved grassland with areas of wetland species. Other habitats present include Alder Carr, plantation coniferous woodland, a botanically diverse artificial fishing pool and the Black Bourne Brook which is also diverse.	Within land required	CFA21
Rough Leasow SBI	SK144030	Conifer/broadleaved plantation, with scots pine and larch dominant. The woodland ground layer is dominated by Himalayan balsam and bracken. Woodland ground flora such as bluebells and wood sage are confined the the edges of the woodland. A bridle path runs along the western boundary of the site, along the path are traces of acid grassland. Buzzards are thought to nest in the woodland.	Adjacent to land required	CFA21

Site name and designation	OS grid reference	Site description	Distance from the land required for construction of the Proposed Scheme ⁶ (m) and orientation	Relevant CFA number
Waggoner's Lane (Hedge 1) SBI	SK159013	This Hedgerow is situated on the Eastern boundary of Bangley Lane (known locally as Waggoner's Lane) off Cranebrook Hill Road opposite to White House Farm. Structurally the hedge is valued in particular for its large width, height and shape. The hedge had eleven standard trees along its length and two young trees, which are important for the regeneration of the hedge. The hedge also had a small ditch and a grass verge of over 2m on both sides	Within land required	CFA21
Rookery SBI	SK152025	Ancient and semi-natural woodland. Fairly recent birch/oak wood with a shrub layer dominated by rhododendron (<i>Rhododendron ponticum</i>).	Within land required	CFA21
Moor Covert and Pool SBI	SK145055	A mature mixed deciduous/conifer plantation and the adjacent pool.	Adjacent to land required	CFA21
Snake's Hill and River Oxbow, Black Brook SBI	SK154032	A mixed river, woodland and grassland/marsh SBI comprising four sub sites.	Within land required	CFA21
Roundhill Wood SBI	SK157022	Ancient and semi-natural woodland. Fairly open oak/birch/sycamore wood with a bracken (<i>Pteridium aquilinum</i>) dominated ground flora and large areas of rhododendron.	Within land required	CFA21
John's Gorse SBI	SK107141	Ancient and semi-natural woodland. Semi-natural broad-leaved with a canopy made up of sycamore (<i>Acer pseudoplatanus</i>), hazel (<i>Corylus avellana</i>) and rowan (<i>Sorbus aucuparia</i>). Ground flora is poor here with only rarely occurring bluebells, mainly dominated by grasses.	Within land required	CFA22
Tomhay Wood SBI	SK115133	A remnant area of ancient woodland with some planted areas of larch (<i>Larix sp</i>), spruce and the exotic species turkey oak (<i>Quercus cerris</i>). The wood is in a degraded state with rhododendron (<i>Rhododendron ponticum</i>), Himalayan balsam (<i>Impatiens glandulifera</i>) and bracken (<i>Pteridium aquilinum</i>) becoming dominant in places.	Adjacent to land required	CFA22
Ravenshaw Wood, Black Slough and Slash SBI	SK124137	Retained grade as SBI from 2003. Parts are ancient semi-natural woodland and ancient replanted Woodland. The site comprises the contiguous areas of woodland known as The Slaish, east of The Slaish, Black Slough, and Ravenshaw Wood that is connected to the other woods by a small block of grassland with scattered trees.	Within land required	CFA22
Trent and Mersey Canal and Coventry Canal, King's Bromley Wharf to Fradley Junction and, Fradley Junction to Fradley Bridge SBI	SK128134	Two lengths of canal that meet at Fradley Junction that support diverse bands of both marginal and emergent vegetation, which include several uncommon and rare species for the county.	Crossed by the route of the Proposed Scheme	CFA22

Site name and designation	OS grid reference	Site description	Distance from the land required for construction of the Proposed Scheme ⁶ (m) and orientation	Relevant CFA number
Woodend Lock (south-east of) SBI	SK131132	A small deciduous wood, beside the Trent and Mersey Canal, that is bordered by a small stream on its western boundary and which contains a steep-sided pond	Within land required	CFA22
Big Lyntus SBI	SK131129	Upgraded from BAS, ancient and semi-natural woodland and ancient replanted woodland. A mixture of mixed semi-natural broadleaved that was clear felled during the second world war and a number of adjoining compartments including planted broadleaves and planted conifers with a diverse ground flora including bluebell and yellow archangel.	Within land required	CFA22
Curborough House hedgerows SBI	SK133124	Consists of hedgerows (hedge 1 and hedge 4) either side of Netherstowe Lane just off Wood End Lane near Curborough village. Hedge 1 contains 13 canopy species, three standard trees along its length and has a small ditch, a small bank and a two-metre grass verge on one side. This hedge contains dogwood as well as other interesting species such as wych elm, black bryony and white bryony. Hedge 4 has 13 canopy species, ten standard trees along its length, and a small ditch and a two-metre grass verge on one side. This hedge also contains dogwood as well as other interesting species such as crab apple, black bryony and white bryony.	Adjacent to land required	CFA22
Coventry Canal: Huddlesford to Whittington SBI ⁷	SK157092	A length of canal bounded on both sides by species-rich bands of both emergent and marginal vegetation.	20m	CFA22
Whittington Heath Golf Course SBI	SK143078	A golf course partly colonised by immature woodland with acid grassland and heathland mosaic in the fairways.	Within land required	CFA22
Vicar's Coppice BAS	SK112137	7ha of semi natural broadleaved woodland whose ground flora has become degraded due to disturbance as a paintball shooting covert.	Within land required	CFA22
Huddlesford Strip BAS	SK156098	Linear tracts of woodland approximately 800m in length along the verges of Park Lane located in Whittington. The canopy is predominantly composed of pedunculate oak and sycamore with occasional ash. A small number of garden escapes are present throughout the site. Japanese knotweed is also present but is rare overall. A small, stagnant pond occupies the far eastern end of the site but lacks any marginal vegetation.	90m	CFA22

⁷ Although Coventry Canal: Huddlesford to Whittington SBI is close to the Proposed Scheme there are no significant effects anticipated and therefore it is not mentioned within the Volume 2 report for CFA22.

Appendix EC-001-003 | Designated sites

Site name and designation	OS grid reference	Site description	Distance from the land required for construction of the Proposed Scheme ⁶ (m) and orientation	Relevant CFA number
Fradley Wood BAS	SK139136	A large area containing many woodland blocks including both conifer and broadleaved plantation. Large areas of woodland have been felled and the land returned to agriculture or left fallow.	Within land required	CFA22

- 2.3.11 Additionally, Middleton Lakes RSPB Reserve (SP204996) lies adjacent to the Proposed Scheme in the Curdworth to Middleton area (CFA20). The site is regionally important for overwintering wildfowl such as pochard, tufted duck and smew (*Mergellus albellus*). Middleton Lakes is one of the most important sites for breeding waders in the Midlands. The site forms a complex of wetlands along with Middleton Pool SSSI.
- 2.3.12 Staffordshire Wildlife Trust reported verbally during a meeting that the northern part of Ravenshaw, Black Slough and Slaish LWS is wet woodland and on peat.
- 2.3.13 Any additional relevant information on habitats or animal populations within these designated sites is given in the relevant species section.

3 Protected and/or notable flora

3.1 Introduction

- 3.1.1 This section of the appendix presents details of baseline information relating to protected and/or notable flora (including veteran trees) for the section of the Proposed Scheme that will pass through CFA16 to22 inclusive.

3.2 Methodology

- 3.2.1 Desk study records related to protected and/or notable flora (including veteran trees) were obtained from the following data sources:

- Warwickshire Biological Records Centre;
- Warwickshire County Flora Recorders; verbal information given during meetings arranged by Warwickshire Wildlife Trust and Warwickshire County Council; and
- Staffordshire Ecological Record.

- 3.2.2 In addition records of protected and/or notable flora were made during the course of Phase 1 habitat and National Vegetation Classification⁸ (NVC) surveys conducted in support of the Proposed Scheme (see Section 4 and 5).

- 3.2.3 Information on the status of wildflowers internationally, nationally and in Warwickshire and Staffordshire was taken from:

- The Vascular Plant Red Data List for Great Britain⁹ (updated 2010);
- the list of Nationally Rare and Nationally Scarce plants compiled by the Botanical Society of Britain and Ireland (BSBI) and available on their website¹⁰;
- the list of Species of Principal Importance in England in Section 41 of the Natural Environment and Rural Communities Act 2006¹¹;
- references on the status of vascular plants in Warwickshire, including A Checklist of the higher plants of the Vice-County of Warwickshire compiled by Steven Falk¹² and the provisional Warwickshire Rare Plant Register and provisionally updated list of Warwickshire Notables¹³; and
- references on the status of plants in Staffordshire, including A Checklist of the Flora of Staffordshire¹⁴ and the Staffordshire Vice-County Rare Plant Register¹⁵ compiled by John Hawksford.

⁸ NVC is a detailed survey and classification system that is used to compare plant communities with a range of defined community types.

⁹ Cheffings, C. and Farrell, L. Eds. (2006), *The Vascular Plant Red Data List for Great Britain*. JNCC, Peterborough.

¹⁰ Botanical Society of Britain and Ireland (2012), Official list of Nationally Rare and Scarce species in the UK. Online at www.bsbi.org.uk/resources.html. Accessed September 2013.

¹¹ Natural Environment and Rural Communities Act 2006 (Chapter 16). London. Her Majesty's Stationery Office.

¹² Falk, S.J. (2009), *Warwickshire's Wildflowers*. Brewin Books Ltd, Studley.

¹³ Warwickshire Flora Group (in prep.) *Provisional Warwickshire Rare Plant Register and checklist of Warwickshire Notables*. John Walton, pers. comm. September 2013.

¹⁴ Hawksford, J.E. (2013), *A Checklist of the Flora of Staffordshire*. Online at www.bsbi.org.uk/staffordshire.html. Accessed September 2013.

¹⁵ Hawksford, J. (2013), *Staffordshire (V.C. 39) County Rare Plant Register, 2013*. Online at www.bsbi.org.uk/Staffordshire.html. Accessed September 2013.

- 3.2.4 Information on the national status of notable plants, taken from The Vascular Plant Red Data List, is based on the International Union for the Conservation of Nature (IUCN) Red List criteria¹⁶. Under these criteria, Least Concern is a category that includes species that do not qualify for the following status: Critically Endangered, Endangered, Vulnerable or Near Threatened. These species are described as widespread and abundant on the Red List and therefore are not included as notable plants for this assessment.
- 3.2.5 Local status of notable plants was taken from the provisional Warwickshire Rare Plant Register and list of notable plants, Hawksford's Staffordshire Checklist, and the Staffordshire Rare Plants Register.
- 3.2.6 The Rare Plants Register for Warwickshire list all plants on the Red Data List, and those that are Nationally Rare or Nationally Scarce found in the county; as well as Locally Rare species (found in three sites or fewer in the county) or Locally Scarce and Declining species (found in four to 10 sites in the county).
- 3.2.7 The provisional list of Warwickshire Notables contains species defined as "an uncommon plant found at more than 10 sites that is indicative of a good quality habitat". Both the provisional Warwickshire Rare Plant Register and list of Notables includes only records since 1990.
- 3.2.8 The Staffordshire Checklist does not give a status of notable but gives a frequency of occurrence within tetrads (2km x 2km squares) in the county: Very Common, Common, Frequent, Uncommon, Rare or Very Rare. Species with a frequency of Uncommon or Rare or Very Rare were considered to be Staffordshire county notables. Species rare in Staffordshire are those found in between 9 and 38 tetrads in the county, whereas species uncommon in Staffordshire are found in 39 to 109 tetrads. These are distinguished from Very Rare (1 to 8 tetrads) plants.
- 3.2.9 The Staffordshire Checklist lists all the species recorded in the county, not just rarities, but does not define recognised County Rare or Scarce species, which are instead listed in the Rare Plant Register. Staffordshire notable species listed in the tables below are Uncommon or Rare species on the Checklist, but are not found on the Rare Plant Register and therefore not defined as County Rare or Scarce.
- 3.2.10 For this project the definition of a veteran tree is taken from Annex 2 of the National Planning Policy Framework (glossary): "A tree which, because of its great age, size or condition is of exceptional value for wildlife, in the landscape, or culturally."

3.3 Deviations, constraints and limitations

- 3.3.1 The Warwickshire Rare Plants Register was in preparation at the time of writing and therefore subject to change. The status of notable higher plants in Warwickshire was taken from this provisional register and the list of Warwickshire Notables.
- 3.3.2 Information on notable flora was collected during the Phase 1 habitat and NVC surveys. The limitations on these surveys are given in Section 4 and 5. Due to the seasonal variation in emergence of some plant species, surveyors may not have

¹⁶ IUCN. IUCN Red List Categories and Criteria: Version 3.1. 2001. IUCN Species Survival Commission, England, Switzerland and Cambridge, UK.

recorded all notable plant species present. Many of the plant records were obtained within vegetation sampling during NVC surveys and where their exact location was not recorded; details of the site in which they were recorded are given.

- 3.3.3 Information on veteran trees was available for Warwickshire from Warwickshire Biological Records Centre. There was no equivalent information available for Staffordshire.

3.4 Baseline

- 3.4.1 Those records of protected and/or notable species which are located within or adjacent to the land required for construction of the Proposed Scheme and any more distant which are considered potentially subject to adverse effects are considered relevant to the assessment and are reported here.

Desk study

- 3.4.2 A summary of desk study records of protected or notable flora considered relevant to the assessment is provided in Table 3.

Table 3: Desk study records of protected and/or notable species records relevant to the assessment in CFA16 to CFA22 inclusive

Common name	Latin name	Status	Location	CFA	Within the land required for construction of the Proposed Scheme (Yes/No)
Bird's-nest orchid	<i>Neottia nidus-avis</i>	Near Threatened Red listing based on 2001 IUCN guidelines Warwickshire Scarce	Long Itchington and Ufton Wood SSSI	CFA16	No – Proposed Scheme runs in tunnel beneath the SSSI
Lesser butterfly-orchid	<i>Plantanthera bifolia</i>	Vulnerable Red listing based on 2001 IUCN guidelines Warwickshire Rare Species of Principal Importance	Long Itchington and Ufton Wood SSSI	CFA16	No – Proposed Scheme runs in tunnel beneath the SSSI
Pedunculate oak	<i>Quercus robur</i>	Veteran tree	North verge of the Wormleighton to Upper Boddington Road, just west of junction with the Priors Hardwick Road	CFA16	Yes
Spreading hedge-parsley	<i>Torilis arvensis</i>	Nationally Scarce Warwickshire Scarce	Bascote Heath, field south of Welsh Road, north of Long Itchington Wood	CFA16	Yes
Short-styled field-rose	<i>Rosa stylosa</i>	Warwickshire Rare	Fields Farm, Offchurch. Along the north edge of the woodland strip to the south of the farm.	CFA17	Yes
Hazel	<i>Corylus avellana</i>	Veteran tree	Stoneleigh Deer Park, in woods south-east of Stare Bridge	CFA18	Yes

Common name	Latin name	Status	Location	CFA	Within the land required for construction of the Proposed Scheme (Yes/No)
Pedunculate oak	<i>Quercus robur</i>	Veteran tree	Stoneleigh Deer Park, south of Stare Bridge	CFA18	Yes
Pedunculate oak	<i>Quercus robur</i>	Veteran tree	Stoneleigh Deer Park, south-east of Stare Bridge	CFA18	Yes
Turkey oak	<i>Quercus cerris</i>	Veteran tree	National Agricultural Centre, Stoneleigh, north-west part of complex	CFA18	Yes
Pedunculate oak	<i>Quercus robur</i>	Veteran tree	Stoneleigh Park area, between River Avon and B4115	CFA18	Yes
Orpine	<i>Sedum telephium</i>	Warwickshire Scarce	Rough Knowles Wood at the junction of Cryfield Grange Lane and Crackley Lane	CFA18	Yes
Bird's foot	<i>Ornithopus perpusillus</i>	Warwickshire Notable	Disused railway (Kenilworth Greenway) at Burton Green	CFA18	Yes
Hoary cinquefoil	<i>Potentilla argentea</i>	Near Threatened Red listing based on 2001 IUCN guidelines Warwickshire Rare	Coleshill Heath north of South Drive, south-east of Coleshill Estate	CFA19	Yes
Wild pansy	<i>Viola tricolor</i>	Near Threatened Red listing based on 2001 IUCN guidelines Warwickshire Notable	Coleshill Hall Farm, south of road bridge, east bank of River Cole	CFA19	Yes
Wild pansy	<i>Viola tricolor</i>	Near Threatened Red listing based on 2001 IUCN guidelines Warwickshire Notable	Grimstock Country House, Gilson	CFA19	Yes
Wild pansy	<i>Viola tricolor</i>	Near Threatened Red listing based on 2001 IUCN guidelines Warwickshire Notable	Gilson, in field close to junction of Gilson Road and Gilson Drive	CFA19	Yes
Blue water-speedwell	<i>Veronica anagallis-aquatica</i>	Warwickshire Notable	Field east of A446, near Curdworth Bridge, Water Orton	CFA19	No
River water-crowfoot	<i>Ranunculus fluitans</i>	Warwickshire Scarce	Middleton	CFA20	Yes

Field survey

3.4.3

A summary of field records of veteran trees and protected or notable flora considered relevant to the assessment is provided in Table 4.

Appendix EC-001-003 | Protected and/or notable flora

Table 4: Records of veteran trees relevant to the assessment obtained during field survey in CFA16 to CFA22 inclusive

Common name	Latin name	Status	Location (includes NVC ecology survey code)	OS grid reference	CFA	Within the land required for the construction of the Proposed Scheme (Yes/No)
Spring sedge	<i>Carex caryophylla</i>	Warwickshire Notable	Field at Withy Tree Farm, Ladbroke (030-PH2-122001)	SP423588	CFA16	No
Marsh willowherb	<i>Epilobium palustre</i>	Warwickshire Notable	Field at Withy Tree Farm, Ladbroke (030-PH2-122001)	SP424589	CFA16	No
Sharp-flowered rush	<i>Juncus acutiflorus</i>	Warwickshire Notable	Field at Withy Tree Farm, Ladbroke (030-PH2-122001)	SP424589	CFA16	No
Hairy violet	<i>Viola hirta</i>	Warwickshire Notable	Windmill Hill Spinney, east of Ladbroke (030-PH2-123002)	SP424592	CFA16	Yes
Water soldier	<i>Stratiotes aloides</i>	Warwickshire Scarce and Nationally Rare	A medium sized pond (350m ²) with 80% emergent vegetation cover (030-PS2-125001)	SP410608	CFA16	Yes
Spurge laurel	<i>Daphne laureola</i>	Warwickshire Notable	A425 Leamington Road Verge, Southam (030-PH2-126001)	SP404615	CFA16	No
Broad-leaved helleborine	<i>Epipactis helleborine</i>	Warwickshire Notable	A425 Leamington Road Verge, Southam (030-PH2-126001)	SP404615	CFA16	No
Early-purple orchid	<i>Orchis mascula</i>	Warwickshire Notable	A425 Leamington Road Verge, Southam (030-PH2-126001)	SP404615	CFA16	No
Spindle	<i>Euonymus europaeus</i>	Warwickshire Notable	Long Itchington and Ufton Woods SSSI (030-PH2-127001)	SP387624	CFA16	No – Proposed Scheme runs in tunnel beneath SSSI
Water avens	<i>Geum rivale</i>	Warwickshire Scarce	Long Itchington and Ufton Woods SSSI (030-PH2-127001)	SP388628	CFA16	No – Proposed Scheme runs in tunnel beneath SSSI
Hairy wood-rush	<i>Luzula pilosa</i>	Warwickshire Notable	Long Itchington and Ufton Woods SSSI (030-PH2-127001)	SP389627	CFA16	No – Proposed Scheme runs in tunnel beneath SSSI

Common name	Latin name	Status	Location (includes NVC ecology survey code)	OS grid reference	CFA	Within the land required for the construction of the Proposed Scheme (Yes/No)
Wood millet	<i>Milium effusum</i>	Warwickshire Notable	Long Itchington and Ufton Woods SSSI (030-PH2-127001)	SP386630	CFA16	No – Proposed Scheme runs in tunnel beneath SSSI
Common twayblade	<i>Neottia ovata</i>	Warwickshire Notable	Long Itchington and Ufton Woods SSSI (030-PH2-127001)	SP389628	CFA16	No – Proposed Scheme runs in tunnel beneath SSSI
Early-purple orchid	<i>Orchis mascula</i>	Warwickshire Notable	Long Itchington and Ufton Woods SSSI (030-PH2-127001)	SP389628	CFA16	No – Proposed Scheme runs in tunnel beneath SSSI
Wood meadow-grass	<i>Poa nemoralis</i>	Warwickshire Notable	Long Itchington and Ufton Woods SSSI (030-PH2-127001)	SP389628	CFA16	No – Proposed Scheme runs in tunnel beneath SSSI
Wild service-tree	<i>Sorbus torminalis</i>	Warwickshire Notable	Long Itchington and Ufton Woods SSSI (030-PH2-127001)	SP389629	CFA16	No – Proposed Scheme runs in tunnel beneath SSSI
Small-leaved lime	<i>Tilia cordata</i>	Warwickshire Notable	Long Itchington and Ufton Woods SSSI (030-PH2-127001)	SP391629,	CFA16	No – Proposed Scheme runs in tunnel beneath SSSI
Sea clubrush	<i>Bolboschoenus maritimes</i>	Warwickshire Rare	A large pond (3700m ²) with 10% emergent vegetation cover (030-PS2-127001)	SP395623	CFA16	Yes
Yellow archangel	<i>Lamiastrum galeobdolon</i> ssp. <i>monatum</i>	Warwickshire Notable	South Cubbington Wood, east of Cubbington (030-PH2-135001)	SP352689	CFA17	Yes
Wood millet	<i>Milium effusum</i>	Warwickshire Notable	South Cubbington Wood, east of Cubbington (030-PH2-135001)	Recorded at SP350689 SP352689	CFA17	Yes
Yellow archangel	<i>Lamiastrum galeobdolon</i> spp. <i>monatum</i>	Warwickshire Notable	Broadoaks Wood, part of South Cubbington Wood(030-PH2-135003)	SP325904	CFA17	No
Wood millet	<i>Milium effusum</i>	Warwickshire Notable	Broadoaks Wood, part of South Cubbington Wood (030-PH2-135003)	SP352904	CFA17	No

Common name	Latin name	Status	Location (includes NVC ecology survey code)	OS grid reference	CFA	Within the land required for the construction of the Proposed Scheme (Yes/No)
Unbranched bur-reed	<i>Sparganium emersum</i>	Warwickshire Notable	River Avon (main river) (030-RS1-138003)	SP333715 to SP328714	CFA18	Yes
River water-crowfoot	<i>Ranunculus fluitans</i>	Warwickshire Scarce	River Avon (main river) (030-RS1-138003)	SP333715 to SP328714	CFA18	Yes
Turkey oak	<i>Quercus cerris</i>	Veteran tree	Woodland at Stare Bridge, Stoneleigh Park (030-PH2-138006)	SP333716	CFA18	Yes
Small teasel	<i>Dipsacus pilosus</i>	Warwickshire Notable	Woodland alongside River Avon, Stoneleigh Park (030-PH2-139001)	SP320721	CFA18	Yes
Turkey oak	<i>Quercus cerris</i>	Veteran tree	Gilbert's Spinney, Stoneleigh Park (030-PH2-139006)	SP327719	CFA18	No
Pedunculate oak	<i>Quercus robur</i>	Veteran tree	Gilbert's Spinney, Stoneleigh Park (030-PH2-139006)	SP327719	CFA18	No
Pedunculate oak	<i>Quercus robur</i>	Veteran tree	Woodland alongside B4115, Stoneleigh Park (030-PH2-140002)	SP316721	CFA18	No
Thin-spiked wood-sedge	<i>Carex strigosa</i>	Warwickshire Rare	Birches Wood (030-PH2-143001)	SP292744	CFA18	No
Opposite-leaved golden-saxifrage	<i>Chrysosplenium oppositifolium</i>	Warwickshire Notable	Birches Wood (030-PH2-143001)	SP291745	CFA18	Yes
Broad-leaved helleborine	<i>Epipactis helleborine</i>	Warwickshire Notable	Birches Wood (030-PH2-143001)	SP291745	CFA18	Yes
Yellow archangel	<i>Lamium galeobdolon</i> ssp. <i>montatum</i>	Warwickshire Notable	Birches Wood (030-PH2-143001)	SP291745	CFA18	Yes
Wood millet	<i>Milium effusum</i>	Warwickshire Notable	Birches Wood (030-PH2-143001)	SP292744	CFA18	Yes
Wood Speedwell	<i>Veronica montana</i>	Warwickshire Notable	Birches Wood (030-PH2-143001)	SP291745	CFA18	Yes
Opposite-leaved golden-saxifrage	<i>Chrysosplenium oppositifolium</i>	Warwickshire Notable	Greens Wood (030-PH2-143002)	SP289742	CFA18	No

Common name	Latin name	Status	Location (includes NVC ecology survey code)	OS grid reference	CFA	Within the land required for the construction of the Proposed Scheme (Yes/No)
Broad-leaved helleborine	<i>Epipactis helleborine</i>	Warwickshire Notable	Greens Wood (030-PH2-143002)	SP289742	CFA18	No
Yellow archangel	<i>Lamiastrum galeobdolon monatum</i>	Warwickshire Notable	Greens Wood (030-PH2-143002)	SP289742	CFA18	No
Wood millet	<i>Milium effusum</i>	Warwickshire Notable	Greens Wood (030-PH2-143002)	SP289742	CFA18	No
Wood speedwell	<i>Veronica montana</i>	Warwickshire Notable	Greens Wood (030-PH2-143002)	SP287742	CFA18	No
Opposite-leaved golden-saxifrage	<i>Chrysosplenium oppositifolium</i>	Warwickshire Notable	Broadwells Wood, south of Burton Green (030-PH2-144001)	SP281752	CFA18	Yes
Yellow archangel	<i>Lamiastrum galeobdolon</i> ssp. <i>montatum</i>	Warwickshire Notable	Broadwells Wood, south of Burton Green (030-PH2-144001)	SP281752	CFA18	Yes
Small-leaved lime	<i>Tilia cordata</i>	Warwickshire Notable	Broadwells Wood, south of Burton Green (030-PH2-144001)	SP281752	CFA18	Yes
Wood speedwell	<i>Veronica montana</i>	Warwickshire Notable	Broadwells Wood, south of Burton Green (030-PH2-144001)	SP280750	CFA18	Yes
Hairy wood-rush	<i>Luzula pilosa</i>	Warwickshire Notable	Roughknowles Wood (030-PH2-144002)	SP288748	CFA18	Yes
Wood millet	<i>Milium effusum</i>	Warwickshire Notable	Roughknowles Wood (030-PH2-144002)	SP288748	CFA18	Yes
Narrow buckler-fern	<i>Dryopteris carthusiana</i>	Warwickshire Notable	Black Waste Wood, Burton Green (030-PH2-146002)	SP272760	CFA18	Yes
Hairy wood-rush	<i>Luzula pilosa</i>	Warwickshire Notable	Black Waste Wood (030-PH2-146002)	SP272760	CFA18	No
Small-leaved lime	<i>Tilia cordata</i>	Warwickshire Notable	Black Waste Wood (030-PH2-146002)	SP272760	CFA18	No
Broad-leaved helleborine	<i>Epipactis helleborine</i>	Warwickshire Notable	Black Waste Wood South (030-PH2-146005)	SP271758	CFA18	Yes
Yellow archangel	<i>Lamiastrum galeobdolon</i> ssp. <i>montatum</i>	Warwickshire Notable	Black Waste Wood South (030-PH2-146005)	SP271758	CFA18	Yes

Appendix EC-001-003 | Protected and/or notable flora

Common name	Latin name	Status	Location (includes NVC ecology survey code)	OS grid reference	CFA	Within the land required for the construction of the Proposed Scheme (Yes/No)
Hairy wood-rush	<i>Luzula pilosa</i>	Warwickshire Notables	Black Waste Wood South (030-PH2-146005)	SP271758	CFA18	Yes
Small-leaved lime	<i>Tilia cordata</i>	Warwickshire Notable	Black Waste Wood South (030-PH2-146005)	SP271758	CFA18	Yes
Wood speedwell	<i>Veronica montana</i>	Warwickshire Notable	Black Waste Wood South (030-PH2-146005)	SP271758	CFA18	Yes
Great burnet	<i>Sanguisorba officinalis</i>	Warwickshire Notable	Wheeley Moor Farm Meadows (030-PH2-161003)	SP188879	CFA19	Yes
Meadow saxifrage	<i>Saxifraga granulata</i>	Warwickshire Notable	Wheeley Moor Farm Meadows (030-PH2-161003)	SP188879	CFA19	Yes
River water-crowfoot	<i>Ranunculus fluitans</i>	Warwickshire Scarce	River Cole and Meadows (030-PH2-161004)	SP188885	CFA19	Yes
Wood millet	<i>Milium effusum</i>	Warwickshire Notable	The Belt (030-PH2-162001)	SP185 897	CFA19	Yes
Pedunculate oak	<i>Quercus robur</i>	Veteran tree	Dodder's Oak at Gilson (030-PH2-163001)	SP189901	CFA19	Yes
Wood millet	<i>Milium effusum</i>	Warwickshire Notable	The Catmore (030-PH2-163002)	SP181 893	CFA19	No
Marsh willowherb	<i>Epilobium palustre</i>	Warwickshire Notable	Coleshill Sewage Works Meadow South (030-PH2-164001)	SP189914	CFA19	No
Common marsh-bedstraw	<i>Galium palustre</i>	Warwickshire Notable	Coleshill Sewage Works Meadow South (030-PH2-164001)	SP189914	CFA19	No
Yellow loosestrife	<i>Lysimachia vulgaris</i>	Warwickshire Notable	Coleshill Sewage Works Meadow South (030-PH2-164001)	SP189914	CFA19	No
Black poplar	<i>Populus nigra betulifolia</i>	Warwickshire Notable	Coleshill Sewage Works Meadow South (030-PH2-164001)	SP190915	CFA19	No
Marsh dock	<i>Rumex palustris</i>	Warwickshire Rare	Coleshill Sewage Works Meadow South (030-PH2-164001)	SP189913	CFA19	Yes

Common name	Latin name	Status	Location (includes NVC ecology survey code)	OS grid reference	CFA	Within the land required for the construction of the Proposed Scheme (Yes/No)
Bog stitchwort	<i>Stellaria alsine</i>	Warwickshire Notable	Coleshill Sewage Works Meadow South (030-PH2-164001)	SP189914	CFA19	No
River water-crowfoot	<i>Ranunculus fluitans</i>	Warwickshire Scarce	River Tame (main river) (030-RS1-164001)	SP186918 to SP190915	CFA19	Yes
Great burnet	<i>Sanguisorba officinalis</i>	Warwickshire Notable	Curdworth Bridge Meadow North (030-PH2-164002)	SP188918	CFA20	No
River water-crowfoot	<i>Ranunculus fluitans</i>	Warwickshire Scarce	River Tame (030-PH2-164006)	SP189916	CFA19/20	Yes
Moschatel	<i>Adoxa moschatellina</i>	Warwickshire Notable	Cuttlemill Fishery (030-PH2-168001)	SP189949	CFA20	No
Wood millet	<i>Milium effusum</i>	Warwickshire Notable	Cuttlemill Fishery (030-PH2-168001)	SP189950	CFA20	No
Common sedge	<i>Carex nigra</i>	Warwickshire Notable	Middleton Pool SSSI (030-PH2-171001)	SP190982	CFA20	No
Remote sedge	<i>Carex remota</i>	Warwickshire Notable	Middleton Pool SSSI (030-PH2-171001)	SP190984	CFA20	No
Moschatel	<i>Adoxa moschatellina</i>	Warwickshire Notable	Walker's Spinney (030-PH2-171003)	SP183982	CFA20	No
Wood millet	<i>Milium effusum</i>	Warwickshire Notable	Walker's Spinney (030-PH2-171003)	SP183982	CFA20	No
River water-crowfoot	<i>Ranunculus fluitans</i>	Warwickshire Scarce	Langley Brook (030-PH2-171004)	SP184981	CFA20	Yes
Curled pondweed	<i>Potamogeton crispus</i>	Uncommon in Staffordshire	A large (870m ²) partially shaded pond with 20% emergent macrophyte cover (030-PS2-174001)	SK168006	CFA21	Yes
Bulrush	<i>Schoenoplectus lacustris</i>	Uncommon in Staffordshire	A very large (5000m ²) partially shaded pond with 5% emergent macrophyte cover (030-PS2-176001)	SK155028	CFA21	Yes
Great yellow-cress	<i>Rorippa amphibia</i>	Uncommon in Staffordshire	Hints Meadow West (030-PH2-177003)	SK153031	CFA21	Yes
Horned pondweed	<i>Zannichellia palustris</i>	Rare in Staffordshire	Black Brook (030-RS1-177004)	SK147035 to SK151034	CFA21	Yes

Common name	Latin name	Status	Location (includes NVC ecology survey code)	OS grid reference	CFA	Within the land required for the construction of the Proposed Scheme (Yes/No)
Early hair-grass	<i>Aira praecox</i>	Uncommon in Staffordshire	Whittington Heath Golf Course (030-PH2-181001)	SK148077	CFA22	Yes
Pill sedge	<i>Carex pilulifera</i>	Uncommon in Staffordshire	Whittington Heath Golf Course (030-PH2-181001)	SK146075	CFA22	Yes
Heath-grass	<i>Danthonia decumbens</i>	Uncommon in Staffordshire	Whittington Heath Golf Course (030-PH2-181001)	SK146075	CFA22	Yes
Narrow Buckler-fern	<i>Dryopteris carthusiana</i>	Uncommon in Staffordshire	Whittington Heath Golf Course (030-PH2-181001)	SK148078	CFA22	No
Small-leaved Lime	<i>Tilia cordata</i>	Uncommon in Staffordshire	Big Lyntus (030-PH2-187002)	SK131129	CFA22	No
Soft shield-fern	<i>Polystichum setiferum</i>	Uncommon in Staffordshire	Black Slough and Slaish (030-PH2-189001)	SK118140	CFA22	No
Field maple	<i>Acer campestre</i>	Veteran tree	Hanch Hall Farm Woodland (030-PH2-190002)	SK108140	CFA22	Yes

Discussion

- 3.4.4 The desk study identified four species that are within the land required for construction of the Proposed Scheme that are on the Vascular Plant Red Data List for Great Britain. One of these is listed as Vulnerable (considered to be facing a high risk of extinction in the wild): lesser butterfly orchid; and three are Near Threatened (close to qualifying as Vulnerable or higher in the near future): bird's-nest orchid, hoary cinquefoil and wild pansy.
- 3.4.5 Both lesser butterfly-orchid and bird's-nest orchid are found in Long Itchington and Ufton Woods SSSI under which the Proposed Scheme passes in tunnel.
- 3.4.6 The record of hoary cinquefoil for Coleshill Heath has no accompanying data for exact location or year of record. Only a four figure grid reference was provided. Therefore it cannot be determined on the available information if this species is present within the land required for construction of the Proposed Scheme.
- 3.4.7 Other county notable plants identified during the desk study or recorded during field surveys (Phase I habitat and NVC surveys) are Warwickshire Rare, Warwickshire Scarce, Warwickshire Notable or Staffordshire Uncommon plants. No other nationally notable plants were recorded.
- 3.4.8 Four Warwickshire Rare species were identified within the land required for construction of the Proposed Scheme during the desk study and field surveys. These are short-styled field-rose, hoary cinquefoil, thin-spiked wood-sedge and marsh dock.

Records for short-styled field-rose and hoary cinquefoil are from the desk study only and were not confirmed during surveys. These records are either from pre-1990 (short-styled field-rose), or are not dated (hoary cinquefoil). Thin-spiked wood-sedge was recorded at Birch Wood (NVC ecology survey code 030-PH2-143001) in the Stoneleigh, Kenilworth and Burton Green area (CFA18) during field surveys in 2012. Marsh dock was recorded at Coleshill Sewage Works Meadow South (NVC ecology survey code 030-PH2-164001) in the Coleshill Junction area (CFA19) in 2013.

- 3.4.9 Three Warwickshire Scarce species were identified within the land required for construction of the Proposed Scheme during the desk study and field surveys. These are spreading hedge-parsley (Ladbroke and Southam area (CFA16)), orpine (Stoneleigh, Kenilworth and Burton Green area (CFA18)) and river water-crowfoot (Coleshill Junction (CFA19) and Curdworth to Middleton area (CFA20)). River water-crowfoot was confirmed as present in the River Cole (NVC ecology survey code 030-PH2-161004) and Langley Brook (NVC ecology survey code 030-PH2-171004) during field surveys in 2013. The records for spreading hedge-parsley and orpine are from desk study only and were not confirmed during surveys.
- 3.4.10 Species found in more than 109 tetrads are known as Frequent, Common or Very Common plants and these were not assessed as notable species. No species that are very rare in Staffordshire (according to the Staffordshire Checklist) were identified from desk study or field surveys.
- 3.4.11 There are numerous records of bluebell (*Hyacinthoides non-scripta*) obtained from both the desk study and the field survey. This species is listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended)³⁷ which lists protected plants in England. However, this species is listed in respect of Section 13(2) only: plants which are protected from selling, offering for sale, possessing or transporting for the purpose of sale (live or dead, part or derivative); or advertising (any of these) for buying or selling. This species is omitted from the primary offence in the Act of intentional picking, uprooting or destruction due to its widespread distribution and locally high abundance in Britain. As such the species has not been assessed as notable.
- 3.4.12 Eleven veteran trees within the Proposed Scheme were identified during the desk study or recorded during the field surveys. These include four pedunculate oaks (*Quercus robur*), two wild pear (*Pyrus pyraster*) trees, one Turkey oak (*Quercus cerris*) and one hazel (*Corylus avellana*) identified during the desk study. A veteran turkey oak was recorded at Woodland at Stare Bridge, Stoneleigh Park (NVC ecology survey code 030-PH2-138006), and a veteran field maple (*Acer campestre*) was recorded at Hanch Hall Farm Woodlands in the Whittington to Handsacre area (CFA22) (NVC ecology survey code 030-PH2-190002).
- 3.4.13 One veteran oak tree that is within the land required for construction of the Proposed Scheme was identified during the surveys in support of the assessment in a field at Gilson village near Coleshill (NVC ecology survey code: 030-PH2-163001). This tree is identified as a potential Local Wildlife Site (pLWS) in Warwickshire and is known as Dodder's Oak.

³⁷ Her Majesty's Stationary Office, London. *Wildlife and Countryside Act 1981* (England and Wales) (as amended). Ch.69, Schedule 8.

4 Phase 1 habitat survey

4.1 Introduction

- 4.1.1 This section of the appendix presents details of Phase 1 habitat survey¹⁸ data relevant to the section of the Proposed Scheme that will pass through CFA16 to CFA22 inclusive.
- 4.1.2 While the survey was conducted as an Extended Phase 1 habitat survey (i.e. to include scoping for presence or potential to support protected and/or notable species), only the habitat survey elements are reported below. Outputs relating to protected and/or notable species are reported under the relevant section for that species/species group.

4.2 Methodology

- 4.2.1 Details of the standard methodology utilised for extended phase 1 habitat survey is provided in Ecology technical note: Ecological field survey methods and standards (Volume5: Appendix CT-001-000/2).
- 4.2.2 Where access has not been available for field survey, data from Warwickshire and Staffordshire Phase 1 habitat audit survey data has been utilised to provide a description of habitats relevant to the assessment. In all other cases, interpretation of aerial photography has been used to provide an indication of the likely habitats present.
- 4.2.3 Desk study information relevant to the Phase 1 habitat survey was obtained from the following sources:
- Staffordshire Ecological Record;
 - Warwickshire Biological Records Centre;
 - Natural England's National Inventory of Ancient Woodlands;
 - Natural England mapping of habitats of principal importance in England identified in Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006)¹⁹; and
 - Historic Ordnance Survey (OS) maps used to assess presence of historic woodland.
- 4.2.4 The baseline descriptions of different habitat types are described in an order that follows the route of the Proposed Scheme in a south to north direction. Cross references are given where National Vegetation Classification²⁰ (NVC) surveys have also been carried out (refer to Section 5).

¹⁸ Phase 1 habitat survey is the standard system for classifying and mapping habitats. The methodology is defined within Joint Nature Conservation Committee (2010) Handbook for Phase 1 habitat survey – a technique for environmental audit. JNCC, Peterborough.

¹⁹ *Natural Environment and Rural Communities Act 2006* (Chapter 16). London. Her Majesty's Stationery Office.

²⁰ NVC is a detailed survey and classification system that is used to compare plant communities with a range of defined community types.

4.3 Deviations, constraints and limitations

4.3.1 In many locations it has not been possible to determine the precise habitat type for Phase 1 mapping. This is due to a number of reasons including:

- lack of access to land to undertake field surveys; in these cases and particularly in four areas (Ladbroke and Southam (CFA16); Offchurch and Cubbingtonton (CFA17); Stoneleigh, Kenilworth and Burton Green (CFA18) and Drayton Bassett, Hints and Weeford (CFA21)); aerial photography and where available data from pre-existing Phase 1 habitat surveys has been utilised to inform the assessment. The features of ecological interest within the four areas with limited access were mainly mixed farming both pasture and arable with tree lined hedgerows, ponds and pockets of deciduous woodland (Drayton Bassett, Hints and Weeford (CFA21)); arable fields with tree lined hedgerows (Stoneleigh, Kenilworth and Burton Green (CFA18)); arable fields with tree lined hedgerows, scattered trees, ponds and ditches (Offchurch and Cubbington (CFA17)); and arable fields with two large ponds, surrounded by scrub and deciduous woodland; tree lined hedgerows and three parcels of deciduous woodland (Ladbroke and Southam (CFA16)); and
- access permission to undertake survey being granted too late to undertake field surveys within the approved 2013 survey period.

4.4 Baseline

4.4.1 The extent of woodland habitat has been reduced in Warwickshire to small isolated areas since Roman times; the Enclosures Acts of the 18th and 19th centuries resulted in the compartmentalisation of the landscape in the Midlands, with often species-poor and relatively young hedges dividing up the landscape. The gradual clearance of woodland has left Warwickshire with one of the lowest coverage of woodland for any county in Britain today²¹. Ladbroke and Southam (CFA16), Offchurch and Cubbingtonton (CFA17), Stoneleigh, Kenilworth and Burton Green (CFA18), Coleshill Junction (CFA19) and Curdworth to Middleton (CFA20) lie within Warwickshire.

CFA16 Labroke and Southam

4.4.2 Access was obtained to approximately 29% of the area of land required for the construction of the Proposed Scheme and a 250m buffer from this boundary.

Woodland

4.4.3 There are few areas of woodland within the land required for the construction of the Proposed Scheme and where they do occur within the land required for the construction of the Proposed Scheme they generally occupy small, regular shaped land parcels surrounded by arable, or occasionally improved grassland areas. These woodlands are discrete woodlands that are secondary in nature and not ancient (formed since 1600AD). The exception to this is Long Itchington and Ufton Woods Site of Special Scientific Interest (SSSI).

²¹ Steven J. Falk (2009), *Warwickshire's Wildflowers* The wildflowers, shrubs & trees of historic Warwickshire; Warwickshire County Council.

- 4.4.4 Close to the border between Ladbroke and Southam (CFA16) and Greatworth to Lower Boddington (CFA15), directly east of Wormleighton are three small areas of broadleaved woodland: Fox Covert (in Greatworth to Lower Boddington (CFA15)), Berryhill Plantation and Lodge Spinney. A small section of Fox Covert is within the area of land required for construction of the Proposed Scheme, Berryhill Plantation is within 100m of the area of land required for construction of the Proposed Scheme and Lodge Spinney is over 250m from the area of land required for construction of the Proposed Scheme.
- 4.4.5 Berryhill Plantation is a recent plantation of broadleaved trees planted in the twentieth century. The site is listed on the National Inventory of Woodland and Trees and is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. No survey was undertaken at this woodland due to lack of access.
- 4.4.6 A section of woodland around the fish ponds at Lower Radbourne, close to Chapel Bank Cottage, and along a tributary of the River Itchen is within the area of land required for construction of the Proposed Scheme and potentially includes wet woodland, a habitat of principal importance. According to Ordnance Survey maps, fishing ponds were dug at this site between 1959²² and 1980²³. Previously, the site had no ponds and was not wooded. No survey was undertaken at this woodland due to lack of access.
- 4.4.7 Ladbroke Fox Covert is south of Ladbroke Grove Farm and is adjacent to the land required for construction of the Proposed Scheme. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. However, the woodland is not listed as ancient woodland on the Natural England inventory but is well established, showing on Ordnance Surveys maps of 1887²⁴. A stream meets the northern boundary of the wood where there is an area of scrub and trees. The habitat within this woodland has not been surveyed due to lack of access.
- 4.4.8 Directly east of Ladbroke is deciduous woodland called Windmill Hill Spinney, near Ladbroke Hill Farm. The most easterly part of the woodland is within the land required for the construction of the Proposed Scheme. This site includes lowland mixed deciduous woodland, a habitat of principal importance. Both Phase 1 habitat and NVC surveys have been undertaken within this woodland. The woodland is not listed as ancient woodland on the Natural England inventory but is well established, showing on Ordnance Surveys maps of 1887²⁴. The site also includes an area of scrub to the west of the woodland with remnants of calcareous grassland²⁵.
- 4.4.9 Other small areas of broadleaved woodland where Phase 1 habitat surveys have been completed are located south-west of Southam and near Stoney Thorpe Home Farm. These small blocks of woodland comprise mature ash (*Fraxinus excelsior*) trees with an understory of sycamore (*Acer pseudoplatanus*), hazel (*Corylus avellana*) and elder

²² Ordnance Survey (1959), Map of Great Britain. 1:25 000. OS Landranger map. Ordnance Survey.

²³ Ordnance Survey (1980), Map of Great Britain. 1:25 000. OS Landranger map. Ordnance Survey.

²⁴ Ordnance Survey (1887), County Series Map of Warwickshire, 1:2,500 scale.

²⁵ Personal communication between Warwickshire plant recorder and Butterfly Conservation representative at second Warwickshire recorders meeting 05 November 2012.

(*Sambucus nigra*) and tall ruderal species including common nettle (*Urtica dioica*), lords and ladies (*Arum maculatum*), ground ivy (*Glechoma hederacea*) and cleavers (*Galium aparine*).

- 4.4.10 There is an area of broadleaved ancient semi-natural woodland (Thorpe Rough) situated just east of Long Itchington and Ufton Wood SSSI and 350m from the land required for construction of the Proposed Scheme. It consists of mature ash (*Fraxinus excelsior*) and oak (*Quercus robur*), along with field maple (*Acer campestre*), hawthorn (*Crataegus monogyna*) and a dense understory including brambles (*Rubus fruticosus*) and bluebells (*Hyacinthoides non-scripta*).
- 4.4.11 Long Itchington and Ufton Wood SSSI, which is west of Bascote village, is semi-natural, oak dominated ancient woodland situated on an area of underlying limestone. It is also recognised as lowland mixed deciduous woodland, a habitat of principal importance. There are records of bird's-nest orchid (*Neottia nidus-avis*) from 1964, and lesser butterfly-orchid (*Platanthera bifolia*) from 1984, being present within the wood. The SSSI citation also states that wild service-tree (*Sorbus torminalis*), small-leaved lime (*Tilia cordata*), herb Paris (*Paris quadrifolia*), common gromwell (*Lithospermum officinale*), water avens (*Geum rivale*), early purple-orchid (*Orchis mascula*) and twayblade (*Neottia ovata*) are present. A Phase 1 habitat and an NVC survey have been undertaken within this woodland. This woodland is within the land required for construction of the Proposed Scheme.
- 4.4.12 Print Wood, which is west of Long Itchington village, is deciduous ancient replanted woodland. The majority of this woodland is more than 400m from the area of land required for construction of the Proposed Scheme. This woodland has not been surveyed as it is outside of the scope of the Phase 1 habitat surveys.

Scrub

- 4.4.13 Within the wider landscape and away from woodland habitat, patches of scattered scrub were recorded but no areas were considered notable. Along two sections of the Grand Union Canal small patches of dense scrub were recorded, containing species such as blackthorn (*Prunus spinosa*), hawthorn and gorse (*Ulex europaeus*).

Hedgerows

- 4.4.14 Within this area, 67 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations²⁶. Of those that were surveyed 26 qualified as ecologically important hedgerows and 17 of these are within the land required for construction of the Proposed Scheme (see Appendix EC-001-003 for more information). Of the 26 ecologically important hedgerows surveyed in this area, four hedgerows also qualify under the historical value criteria defined in the Hedgerow Regulations and are therefore classed as ancient⁶⁵. Four of these hedgerows are within the land required for the construction of the Proposed Scheme (see Section 8 for more information).
- 4.4.15 In addition 23 species rich hedgerows were also surveyed in this area of which eight are within the land required for construction of the Proposed Scheme.

²⁶ HMSO (1997), *The Hedgerow Regulations*. SI 1197 No. 1160.

- 4.4.16 The majority of the hedgerows surveyed were species-poor hedgerows. There are no hedgerows designated as Local Wildlife Sites (LWS) within 250m of the land required for construction of the Proposed Scheme.
- 4.4.17 Most of the arable fields within this area are bordered by hedgerows. Mature trees are found within these hedgerows including oak, alder, sycamore, willow and ash. Hedgerow species recorded included hawthorn, blackthorn, dogwood (*Cornus sanguinea*), elder, holly, ivy, rose, rowan, field maple (*Acer campestre*) and hazel.

Grassland

- 4.4.18 Grassland occurs more frequently in the north of the area, mostly around Long Itchington and Ufton Wood SSSI. Aerial photography and Phase 1 habitat survey data from Warwickshire Biological Records Centre suggests there is a mixture of small improved and semi-improved grassland fields, likely used for grazing livestock.
- 4.4.19 East of Wormleighton there is an area of lowland dry acid grassland, a habitat of principal importance, which lies approximately 500m from the land required for the construction of the Proposed Scheme. This grassland has not been surveyed due to lack of access.
- 4.4.20 South of Southam, along the A423 Banbury Road, is a small area of lowland meadow in the north-east of Withy Tree Farm near Ladbroke, Warwickshire. This is a habitat of principal importance, which lies within the 250m from the land required for the construction of the Proposed Scheme. An NVC survey has been carried out within the meadow which was found to support permanent semi-improved pasture and damp meadow (see Section 5 for more details). Windmill Lane borders the north side of the site and the area measures approximately 4.9ha. The grassland is grazed by cattle and hay is cut annually. There are signs of an ancient ridge and furrow system indicative of permanent pasture in the absence of ploughing.
- 4.4.21 To the west of Thorpe Rough woodland is Ufton Fields SSSI; containing an area of calcareous grassland which lies over 500m from the land required for construction of the Proposed Scheme. This has not been surveyed as it is outside of the scope of the Phase 1 habitat surveys.
- 4.4.22 Although there are outcrops of Lias Limestone, across Warwickshire, there is no evidence of the presence of any large additional notable calcareous grassland within the area.
- 4.4.23 There is anecdotal information of remnant calcareous grassland near Windmill Hill Spinney, including wildflower margins either side of a farm access track, south of Windmill Hill Spinney. However, recent scrub encroachment and nutrient enrichment along the adjacent field margins has reduced the ecological value of this habitat as seen during the Phase 1 habitat and NVC survey.
- 4.4.24 Sections of semi-improved grasslands and a large area of amenity grassland have been Phase 1 habitat surveyed within the Dallas Burston Polo Club near Stoney Thorpe Farm. The amenity grassland is intensively managed and regularly mown to provide a surface for polo matches and training. The grassland is very species poor. Adjacent to this amenity grassland is an area of semi-improved grassland, bordered by hedgerows, used for grazing horses.

4.4.25 Other grassland areas where Phase 1 habitat survey has been carried out include four small areas of amenity grassland around residential property and a poor semi-improved roadside verge next to some semi-improved grassland fields bordering Long Itchington and Ufton Wood SSSI and Welsh Road.

4.4.26 Further north, there is also a small section of remnant calcareous grassland along Ridgeway Lane, a track and bridleway along Centenary Way, west of Print Wood²⁵.

Watercourses

4.4.27 Watercourses within 100m of the area of land required for construction of the Proposed Scheme include the River Itchen, Oxford Canal and a number of unnamed tributary watercourses.

4.4.28 The following watercourses have been identified which are crossed by the Proposed Scheme:

- Oxford Canal (crossing west of Priors Hardwick);
- River Itchen (crossing south of Stoney Thorpe Home Farm;
- two unnamed tributary watercourses of the River Itchen; and
- one unnamed tributary watercourse of the River Itchen.

4.4.29 Watercourses within 100m of the area of land required for the construction of the Proposed Scheme include:

- two unnamed tributary streams/drains of the River Itchen; and
- one unnamed tributary stream/drain of the River Leam.

4.4.30 There are two Water Framework Directive (WFD) watercourses in the area (River Itchen and Oxford Canal) which fall within the Severn District River Basin Management Plan (RBMP).

4.4.31 NVC vegetation surveys (see Section 5) were carried out on the Oxford Canal. The communities on the banks of the Oxford Canal are tall ruderal stands of wetland species such as meadowsweet (*Filipendula ulmaria*) and great willowherb (*Epilobium hirsutum*), with an abrupt boundary between this habitat and the towpath or the arable fields. Scrub and woodland is rare in the surrounding landscape south of Ladbroke.

4.4.32 The canal bank vegetation is unchecked on the southern bank, where it forms the edge of the field margins. On the northern bank alongside the towpath, the bank side vegetation is checked by mowing or trampling on the towpath, and consequently forms a narrow strip. The canal banks are natural, but steep and emergent species are limited to a few stands of iris (*Iris* sp.) or reed sweet-grass (*Glyceria maxima*). There are no visible aquatic species floating on the surface due to the regular use of the canal by narrow boats. The wetland communities on the canal edge were sampled and are reported on within the NVC section for this area.

Water bodies

- 4.4.33 The total number of ponds and ditches identified from aerial photography and OS maps within 500m of the area of land required for the construction of the Proposed Scheme is 133 of which 89 are ponds and 44 are ditches. This includes:
- 22 within the area of land required for construction of the Proposed Scheme;
 - 38 between 100m and the area of land required for construction of the Proposed Scheme;
 - 42 between 100m and 250m from the area of land required for construction of the Proposed Scheme; and
 - 31 between 250m and 500m of area of land required for construction of the Proposed Scheme.
- 4.4.34 Of the ponds identified within 500m of the area of land required for construction of the Proposed Scheme, 60 have been assessed for their Habitat Suitability Index (HSI) as part of great crested newt presence/absence surveys (further detailed information can be found within Appendix EC-002-003). The majority of the ponds surveyed are within arable fields or semi-improved grasslands, often surrounded by scrub. Of particular note is the presence of the near threatened²⁷ aquatic plant, watersoldier (*Stratiotes aloides*) within a pond near Southam (see Section 10).

Ephemeral/short perennial

- 4.4.35 A small area of ephemeral/short perennial was recorded during a phase 1 habitat survey, surrounding a hardstanding yard area. This area included mayweed (*Matricaria species*), common teasel (*Dipsacus fullonum*), groundsel (*Senecio vulgaris*) and common field speedwell (*Veronica persica*). A review of the Phase 1 habitat data from Warwickshire Biological Records Centre and aerial imagery does not reveal extensive large areas of ephemeral or short perennial habitats in this area.

Arable/cultivated land

- 4.4.36 Some areas of arable land were surveyed during Phase 1 habitat surveys. These areas are mostly intensively cultivated and bordered by hedgerows with narrow field margins.
- 4.4.37 A review of aerial mapping data and Phase 1 habitat data from Warwickshire Biological Records Centre show that the area is mostly large arable fields with occasional hedgerows and trees.

Buildings/structures

- 4.4.38 Within the area there is a low density of buildings within or adjacent to the area of land required for construction of the Proposed Scheme. Most of these are isolated farmsteads, with the exception of Southam Industrial Estate. There are no large areas of residential properties within or adjacent to the area of land required for construction of the Proposed Scheme and the town of Southam lies beyond 500m.

²⁷ Cheffings, C.M. & Farrell, L. (Eds), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. (2005), The Vascular Plant Red Data List for Great Britain. *Species Status* 7: 1-116. Joint Nature Conservation Committee, Peterborough.

- 4.4.39 Initial assessments of six buildings and/or structures currently identified to be at high risk of demolition were undertaken. A further five buildings and/or structures were subjected to initial assessments within the land required for the construction of the Proposed Scheme and eight buildings within 100m of land required for the construction of the Proposed Scheme were also subjected to initial assessments.

CFA17 Offchurch and Cubbington

- 4.4.40 Access was obtained to approximately 16% of the area of land required for the construction of the Proposed Scheme and a 250m buffer from this boundary.

Woodland

- 4.4.41 At the southern boundary of the Offchurch and Cubbington area, deciduous woodland is adjacent to the Grand Union Canal. No survey was undertaken at this woodland due to lack of access. The woodland is within the land required for the construction of the Proposed Scheme. The woodland, which lies to the south of the canal, on the opposite side to the towpath, appears to be wet woodland which is a habitat of principal importance²⁸;
- 4.4.42 North of the Grand Union Canal and south of Burnt Heath Farm is a strip of broad leaved plantation. The strip is approximately 40m wide and approximately 750m long and is along the boundary of an arable field. The woodland is within the land required for the construction of the Proposed Scheme. No survey was undertaken due to a lack of access.
- 4.4.43 Burnt Firs is an area of broadleaved woodland surrounding a small reservoir, near Burnt Heath Farm. No survey was undertaken due to a lack of access.
- 4.4.44 Broadleaved woodland occurs along the Offchurch Greenway, part of a disused railway line that will be crossed by the Proposed Scheme. It includes a public footpath and cycleway forming part of the Cycle Network for Sustrans and joins the Rugby to Leamington Disused Railway LWS to the east of the Proposed Scheme. An NVC survey was undertaken along this section of the disused railway line. A secondary woodland community has developed on the steep embankments of this section of Offchurch Greenway. Due to nutrient enrichment at the bottom of the slope and the dense cover of scrub has resulted in a poor ground flora community dominated by species that favour high nutrient environments, including common nettle.
- 4.4.45 Sutton Spinney is broad-leaved woodland adjacent to the Offchurch Greenway. It is adjacent to the the land required for the construction of the Proposed Scheme. No survey was undertaken at this woodland due to lack of access.
- 4.4.46 North of Offchurch is a small area of secondary woodland (Ash Beds) bordering a tributary watercourse of the River Leam that will be crossed by the Proposed Scheme. The woodland does not show signs of past or recent management. The site is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. The woodland has had a Phase 1 habitat and NVC survey undertaken (see Section 5). The woodland appears to be characteristic of young woodland stands with dense canopy and shrub cover. In the canopy the most

²⁸ *Natural Environment and Rural Communities Act 2006* (Chapter 16). Her Majesty's Stationery Office.

frequent tree is ash, which dominates in much of the wood. Pedunculate oak is only occasionally found. Other trees present include mature wych elm, common lime and crack willow, the latter growing alongside the stream. There is a dense shrub layer formed primarily of common hawthorn and elder, with scattered holly and stands of blackthorn. There is one stand of non-native snowberry (*Symphoricarpos alba*). Ash saplings are common and grey willow occasional by the stream.

4.4.47 Cubbington Wood is divided into two woodlands (north and south) separated by the B4453 Rugby Road. North Cubbington Wood (to the north of the B4453 Rugby Road) is an area of ancient replanted woodland. The northernmost part of this woodland is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance, whereas the most southern section of this woodland is extensively plantation. No survey was undertaken here due to a lack of access.

4.4.48 The woodland to the south of B4453 Rugby Road is South Cubbington Wood. South Cubbington Wood is an LWS and detailed botanical surveys (see NVC Appendix EC-001-003 for more details) have been undertaken within this woodland. South Cubbington Wood is ancient replanted woodland and recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. The south western section of South Cubbington Wood is within the land required for the construction of the Proposed Scheme. The woodland sub-community mentioned on the LWS citation is locally rare in Warwickshire. The canopy has abundant pedunculate oak, with ash frequent. Silver birch (*Betula pendula*), sycamore, aspen (*Populus tremula*) and rowan (*Sorbus aucuparia*) are also present at low abundance. Hazel coppice is abundant throughout, but hazel growth has been affected by the shaded conditions caused by the closed canopy such that the coppice stools are not densely spaced, and it is easy to walk between them. Other shrubs include common hawthorn, field maple, holly, wild apple and blackthorn. The ground flora is dominated by bluebell throughout, with wood millet (*Milium effusum*) frequent and wood anemone occasionally recorded.

Scrub

4.4.49 Patches of scrub, which included species such as common hawthorn, blackthorn, crack willow (*Salix fragilis*) and holly (*Ilex aquifolium*) were recorded within South Cubbington Wood. Within the wider landscape and away from woodland habitat, patches of scattered scrub such as common hawthorn and gorse were recorded. The Warwickshire Phase 1 habitat audit survey data and aerial photography show no large areas of notable scrub habitat.

Hedgerows

4.4.50 Within this area, 74 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations. Of those that were surveyed, 35 qualified as an ecologically important hedgerow and of these 26 are within the land required for the construction of the Proposed Scheme.

4.4.51 Of the 35 ecologically important hedgerows surveyed in this area, five hedgerows also qualify under the historical value criteria defined in the Hedgerow Regulations and are therefore classed as ancient⁶⁵. Four of these hedgerows are within the land required for the construction of the Proposed Scheme (see Section 8).

4.4.52 In addition one species rich hedgerow was also surveyed in this area and this is within the land required for construction of the Proposed Scheme.

4.4.53 The majority of hedgerows are species poor and common hawthorn dominated and are not considered important under the hedgerow regulations in terms of wildlife criteria. The dominant species within the majority of the species-poor hedgerows were ash, blackthorn, dog rose and elder.

Grassland

4.4.54 According to Warwickshire Phase 1 habitat audit survey data there are a number of small improved grassland fields within Offchurch and Cubbington and also two small semi-improved grassland fields; these could be be arable set aside land or land used for grazing.

4.4.55 Although there are notable calcareous grasslands within Warwickshire lying on outcrops of Lias Limestone, such as at Ufton Fields SSSI, there is no evidence for the presence of notable grasslands within Offchurch and Cubbington.

4.4.56 However, there is anecdotal information of remnant calcareous grassland along Ridgeway Lane (track) between Print Wood and the Grand Union Canal²⁵ part of which is within the area of land required for the construction of the Proposed Scheme.

Watercourses

4.4.57 Watercourses within 100m of the land required for the construction of the Proposed Scheme include the River Leam, Grand Union Canal, three unnamed tributary watercourses of the River Leam and one unnamed tributary stream/drain of the River Avon.

4.4.58 Within Offchurch and Cubbington, the following watercourses have been identified which are crossed by the Proposed Scheme:

- unnamed tributary stream of the River Leam adjacent to the Grand Union Canal (crossing just south of the Grand Union Canal);
- Grand Union Canal (crossing near Longhole Bridge);
- unnamed tributary watercourse of the River Leam (crossing at Ash Beds woodland); and
- River Leam (crossing near Lower Grange).

4.4.59 Watercourses within 100m of the land required for the construction of the Proposed Scheme that are not crossed by the Proposed Scheme:

- one tributary drain of the River Leam; and
- two tributary watercourses of the River Avon.

4.4.60 In addition to these crossings, there are a number of Proposed Scheme road diversions and footpaths which would result in the following:

- road crossing of an unnamed tributary watercourse of the River Leam (0.36km west);

- road crossings of an unnamed tributary watercourse of the River Leam (0.12km east and 0.04km west); and
- footpath crossing of an unnamed tributary watercourse of the River Leam (0.16km east).

4.4.61 A section of the Grand Union Canal north of the village of Ufton between Welsh Road Bridge to the east and a canal lock to the west (part of Bascote Locks) was NVC surveyed (see Section 5). The banks along this stretch of canal are supported by wooden revetments, with the banks of the mooring areas close to the lock strengthened with bricks and concrete. The towpath is mown up to the canal edge and separated from neighbouring arable land by a high species poor hedgerow. The southern bank is also supported by wooden revetments and adjacent to dense mature scrub and woodland.

4.4.62 An NVC survey was carried out on a section of the River Leam (see Section 5). The survey site selected included the river up to 100m upstream and downstream of the point of crossing of the Proposed Scheme. The survey site includes a medium flow stretch of river (4m wide) surrounded by arable fields situated south west of Hunningham and north east of Royal Leamington Spa. The channel has a developed marginal vegetation community established on a narrow 1m wide strip along the riverbank extending up to 5m wide occasionally. The riverbanks are steep and there are signs of erosion and slumping. Crack willow and immature alder (*Alnus glutinosa*) trees were recorded occasionally on the riverbank but generally the habitat was open and unshaded. Species present in this marginal community included reed canary grass, common nettle, hedge bindweed (*Calystegia sepium*) and common orache (*Atriplex patula*). Marsh woundwort (*Stachys palustris*), water forget-me-not (*Myosotis scorpioides*) and reed sweet grass were also occasional in abundance.

Water bodies

4.4.63 The total number of ponds and ditches identified from aerial photography and OS maps within 500m of the area of land required for the construction of the Proposed Scheme is 50 of which 40 are ponds and 10 are ditches. This includes:

- 4 within the area of land required for construction of the Proposed Scheme;
- 16 between 100m and the area of land required for construction of the Proposed Scheme;
- 19 between 100m and 250m from the area of land required for construction of the Proposed Scheme; and
- 11 between 250m and 500m of area of land required for construction of the Proposed Scheme.

4.4.64 Of the ponds identified within 500m of the area of land required for construction of the Proposed Scheme, 12 have been assessed for their Habitat Suitability Index (HSI) as part of great crested newt presence/absence surveys (further detailed information can be found within Volume 5: Appendix EC-002-003). The majority of the ponds surveyed are within arable fields or semi-improved grasslands, often surrounded by scrub.

Arable/cultivated land

- 4.4.65 The Warwickshire phase 1 habitat audit survey data and aerial photographs show that the area within Offchurch and Cubbington area is mostly large arable fields with occasional hedgerows and trees.

Buildings/structures

- 4.4.66 The buildings and structures found within Offchurch and Cubbington area are mainly isolated farmsteads. There are also a small number of residential properties that fall within 500m of the Proposed Scheme in the villages of Offchurch and Cubbington.
- 4.4.67 No buildings and/or structures are currently identified to be at high risk of demolition within CFA17. Eighteen buildings within 100m of land required for the construction of the Proposed Scheme were subjected to initial assessments.

CFA18 Stoneleigh, Kenilworth and Burton Green

- 4.4.68 Access was obtained to approximately 72% of the area of land required for the construction of the Proposed Scheme and a 250m buffer from this boundary.

Woodland

- 4.4.69 There are many woodland blocks south of Stoneleigh at the southern end of the area, some of which are ancient woodland.
- 4.4.70 Hares Parlour is adjacent to the area of land required for the construction of the Proposed Scheme. Brick Kiln Spinney is approximately 200m from the area of land required for the construction of the Proposed Scheme. Both woodlands are located on the south-eastern side of Stoneleigh Park alongside the B4113 Stoneleigh Road. They are not listed as ancient woodland but are lowland mixed deciduous woodland, which is a habitat of principal importance. No Phase 1 habitat survey was undertaken at either of these woodlands due to a lack of access.
- 4.4.71 Bordering Stoneleigh Park (formerly known as the National Agricultural Centre) to the east are; Gilbert's Spinney which is approximately 100m from the area of land required for the construction of the Proposed Scheme; Stoneleigh Hill which is 200m from the area of land required for the construction of the Proposed Scheme and Motslowhill Spinney which is approximately 400m from the area of land required for the construction of the Proposed Scheme. Gilbert Spinney has had Phase 1 habitat and NVC surveys (see Section 5), whereas the other three woodlands have not been surveyed due to lack of access.
- 4.4.72 To the north of these woodlands is Sowe Mouth Plantation, located along a section of the River Avon. Sowe Mouth Plantation is approximately 100m from the area of land required for the construction of the Proposed Scheme. No survey was undertaken at this woodland due to lack of access.
- 4.4.73 Glasshouse Wood is 300m south-west of the Proposed Scheme adjacent to the A46 Kenilworth Bypass. It is semi-natural ancient woodland and is lowland mixed deciduous woodland, a habitat of principal importance. The habitat within this woodland has not been surveyed due to lack of access.
- 4.4.74 Between the B4115 Ashow Road and the A46 Kenilworth Bypass, is a small patch of ancient woodland and lowland mixed deciduous woodland called Kings Wood. The

most south-westerly corner of this woodland is adjacent to the the land required for the construction of the Proposed Scheme. There is also a strip of woodland called Gilbert Hill. Neither of these two woodlands has been Phase 1 surveyed due to lack of access. A group of woodlands occur between Kenilworth and Burton Green, which all include lowland mixed deciduous woodland, a habitat of principal importance. Phase 1 habitat and NVC surveys have been undertaken within these woodlands:

- Crackley Wood Local Nature Reserve and LWS (west of Crackley, adjacent to Kenilworth Greenway and south of the scheme and approximately 250m outside the area of land required for the construction of the Proposed Scheme). This is ancient woodland;
- Crackley Wood North, north of the Kenilworth Greenway, is not designated but contains ancient semi-natural woodland;
- a broadleaved woodland to the north of Crackley Wood North (not named on OS maps but called Birches Wood for the purposes of assessment). Birches Wood is not on the ancient woodland inventory but is shown on historic maps as part of a larger ancient woodland block; this is also indicated by the woodland flora present;
- a strip of sycamore and beech broadleaved woodland east of Birches Wood Farm;
- a narrow strip of broadleaved woodland alongside Kenilworth Greenway (contiguous with Crackley Wood);
- Roughknowles Wood (adjacent to Cryfield Grange Road and north but adjacent to the area of land required for the construction of the Proposed Scheme). This is ancient woodland;
- Broadwells Wood LWS and semi-natural ancient woodland (south of Crackley Lane and within the area of land required for the construction of the Proposed Scheme);
- Black Waste Wood LWS (south-east of Burton Green and within the area of land required for the construction of the Proposed Scheme) is ancient woodland; and
- Little and Big Pools Wood LWS (south of Burton Green and within the area of land required for the construction of the Proposed Scheme).

4.4.75 Crackley Wood North is on the northern side of the Kenilworth Greenway (disused railway line), adjacent to Crackley Wood Local Nature Reserve and LWS. The northern part of this habitat is open woodland and there is a residential property that links this with Birches Wood. To the east and west of the wood is arable land. Crackley Wood North is used by the University of Warwick and some small temporary buildings (shed, marquee etc.) are evident. Crackley Wood North is listed as ancient woodland.

4.4.76 The woodland community within Crackley Wood North is characterised by a closed canopy of pedunculate oak and silver birch, which are frequent throughout. Bluebell is very abundant in the ground flora and would be dominant in the spring and yellow

archangel (*Lamiasium galeobdolon*) is abundant in some areas where it forms patches of sprawling plants.

- 4.4.77 Birches Wood includes an outcrop of woodland linked to Crackley Wood North. NVC surveys were conducted on an eastern compartment. The wood includes a stream that flows west to east out into arable fields to the east. Birches Wood was once a much larger woodland area, (1887 OS map). Prior to the 1950s, fields to the north were turned to arable land, and much of the woodland within Birches Wood Farm was removed or replanted with conifer species.
- 4.4.78 The woodland canopy of Birches Wood is dominated by pedunculate oak, with occasional alder (*Alnus glutinosa*) and downy birch (*Betula pubescens*). In the ground flora, bramble is abundant and locally dominant, with bluebell also abundant. Yellow archangel is locally abundant.
- 4.4.79 The Kenilworth Greenway is a disused railway corridor that has been resurfaced and is used as a foot and cycle path. It forms part of the Coventry Way (a long-distance path). The former railway formed a connection between the Coventry to Leamington railway line and the Rugby to Birmingham railway line between Crackley and Balsall Common. The cuttings and embankments of the Kenilworth Greenway are now mainly wooded, although small patches of coarse grassland are present.
- 4.4.80 The linear woodland that is found either side of the Kenilworth Greenway has a canopy of semi-mature pedunculate oak and ash. Silver birch and goat willow (*Salix caprea*) are scattered throughout, and sycamore is frequent at one location. In the shrub layer there is abundant hawthorn, with hazel, elder, grey willow (*Salix cinerea*) frequent. Other shrub species such as dog rose (*Rosa canina* agg.) and holly are occasionally found.
- 4.4.81 Roughknowles Wood lies to the north of Birches Wood and in the past formed the northernmost block of contiguous woodland which joined Crackley Wood LWS in the south. Roughknowles Wood is situated to the north-east of the junction of Crackley Lane and Cryfield Grange Road. It is listed as lowland mixed deciduous woodland and has ancient woodland status. It is surrounded by arable land with a pasture field to the north. The woodland is used at times for grazing pigs; there is electric fencing forming pens in parts of the wood.
- 4.4.82 Past management and the actions of pig grazing have resulted in a marked contrast between Roughknowles Wood and Birches Wood or Crackley Wood North. The canopy is dominated by frequent but scattered pedunculate oak with dense growth of young downy birch and locally frequent young Scots pine. Wild cherry (*Prunus avium*) is prominent locally, in stands derived from suckering old trees. Ash and sycamore was present but rare at the site. Young birch, pine and oak form a shrub layer, with hazel occasionally present, and rowan, holly and hawthorn very occasionally found.
- 4.4.83 The ground flora within Roughknowles Wood is distinctive due to the dominance of foxglove in large patches (presumably due to the grazing out of other species by pigs). Bracken (*Pteridium aquilinum*) is locally dominant where pigs have been excluded.
- 4.4.84 Broadwells Wood is a LWS in Warwickshire, is lowland mixed deciduous woodland, a habitat of principal importance and is semi-natural ancient woodland. It has had an NVC survey undertaken (see Section 5). The woodland is relatively large wood (17.6ha)

and is comprised of mature standards of pedunculate oak, birch and ash, together with some conifers and sycamore, over an understorey of hazel coppice, holly and hawthorn. The woodland canopy is composed of pedunculate and ash standards. Planted Scots pine, Norway spruce (*Picea abies*), common larch, sweet chestnut and sycamore are also present.

- 4.4.85 Black Waste Wood LWS is semi-natural ancient woodland located east of Burton Green and north of the Kenilworth Greenway. NVC surveys were carried out on a part of the woodland, which lies at the rear of a property on Cromwell Lane. Although adjacent and connected to Black Waste Wood, this surveyed compartment is not ancient woodland. It is situated on level ground raised above the arable land to the east, from which it is separated by a path. This woodland compartment has a canopy of mixed ash and pedunculate oak with a few silver birch and downy birch. One or two substantial small-leaved limes, which appear to have been coppiced in the past, are present close to the eastern boundary.
- 4.4.86 Little and Big Pools Wood LWS, west and adjacent to Burton Green, is an area of broadleaved (mainly oak) woodland with sparse understory of holly and hazel. The understory becomes denser in the north corner around the disused railway where Spanish bluebell (*Hyacinthoides hispanica*) and variegated yellow archangel (*Lamiastrum galeobdolon* spp. *argentatum*) was recorded. Both of these species are non-native plants.
- 4.4.87 Other areas of woodlands that have been surveyed as part of Phase 1 habitat and NVC surveys, and are within or immediately adjacent to the area of land required for the construction of the Proposed Scheme, are Stareton and Stoneleigh Woodlands (part of Stoneleigh Park and therefore discussed below under the Parklands section).

Scrub

- 4.4.88 Scrub was recorded scattered along field edges and surrounding ponds. Species include holly, rose (*Rosa* sp.), gorse (*Ulex europaeus*), bramble, hawthorn, blackthorn, alder and elder with occasional ash and mature oak in places. The habitat audit data from Warwickshire Biological Records Centreshows no large areas of scrub but only small isolated patches are present within this area.

Hedgerows

- 4.4.89 Within this area, 202 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations²⁶. Of those that were surveyed, 56 qualified as an ecologically important hedgerow and of these 32 are within the land required for the construction of the Proposed Scheme (see Section 8).
- 4.4.90 In addition 57 species rich hedgerows were also surveyed in this area of which 11 are within the land required for construction of the Proposed Scheme. The majority of the hedgerows surveyed are species-poor hedgerows. Most of the arable fields are bordered by hedgerows. Mature trees are found within these hedgerows including oak, alder, sycamore, willow and ash. Hedgerow species recorded include hawthorn, blackthorn, elder, holly, ivy, rose, rowan, field maple (*Acer campestre*) and hazel. Other species noted in these hedgerows are crab apple (*Malus sylvestris*), aspen (*Populus tremula*), white bryony (*Bryonia dioica*) and wild pear (*Pyrus pyraster*).

Parkland and scattered trees

- 4.4.91 There is a large area of parkland associated with Stoneleigh and Stareton which is part of the Stoneleigh Deer Park which includes scattered trees, some of which are veteran, and woodland blocks. Much of the former deer park is now the Stoneleigh Deer Park Golf Club, though this retains many veteran trees.
- 4.4.92 The 1886²⁹ OS map of Stoneleigh Deer Park shows a relatively open area, with scattered park trees and lightly wooded fringes. Some of the woodland blocks are recent plantation. Scattered throughout are some very ancient park trees, with veterans up to 250 years old. Planting of exotics is common and there are also areas of poplar (*Populus* sp.) and willow (*Salix* sp.) varieties. NVC surveys have been carried out at seven woods located within Stoneleigh Park:
- Woodland 1 – this is a small farm woodland planting (approximately 0.2ha) of mixed broadleaves, about 20-25 years old;
 - Woodland 2 – this comprises six mature (>100 years old) pedunculate oaks, flanked by young wood planting to the north and east, consisting of oak, ash, cherry (*Prunus* sp.), birch and larch (*Larix* sp.) at 2m spacing. The area under the oak clump is very much disturbed, having recently been used as a pig pen;
 - Woodland 3 – this 3.7ha wood beside the River Avon is a complex of plantation, older woodland and ornamental planting. The large section to the north includes a poplar plantation. Trees are evenly spaced along a gently sloping floodplain, the light canopy allowing a grassy and tall herb field layer to persist, dominated by species such as common nettle, false oat-grass (*Arrhenatherum elatius*) and hogweed (*Heracleum sphondylium*);
 - Woodland 4 – a recent cricket bat willow (*Salix alba* ssp. *coerulea*) plantation of approximately 1.5ha lying adjacent to the River Avon. Natural scrub is developing, comprising alder, elder, hawthorn, pedunculate oak, goat willow and grey willow, with a tall herb layer beneath, dominated by Indian balsam (*Impatiens glandulifera*) and common nettle;
 - Woodland 5 – this 0.7ha strip of woodland runs along the B4115, bounded at the roadside by a hawthorn hedge and by an old sunken lane to the south. The canopy consists of ancient, tall pedunculate oak with ash, birch, beech and wych elm (*Ulmus glabra*), together with planted copper beech (*Fagus sylvatica* ssp. *purpurea*) and hybrid poplar;
 - Woodland 6 – further along the B4115 to the west of Wood 5, this is a small section of wood that occupies an area of about 100x25m. The canopy consists of several ancient individuals of beech and oak, planted underneath. There are elements of an ancient woodland flora, including abundant bluebell, and wood millet (*Milium effusum*), creeping soft-grass (*Holcus mollis*) and holly; and
 - Woodland 7 – this woodland is formed on a steep bank above the River Avon and contains a few veteran oaks around the perimeter, but is mainly comprised of a plantation of Scots pine, with some pedunculate oak and Turkey oak

²⁹ Ordnance Survey (1886), Map of Great Britain. 1:10 000 Ordnance Survey.

(*Quercus cerris*). Underneath there is a developing scrub layer of hawthorn, elder, hazel and holly.

Grassland

- 4.4.93 According to pre-existing data, there is improved and semi-improved grassland within the local landscape; these could be arable set aside land or land used for grazing.
- 4.4.94 Five small areas of improved and semi-improved grassland were surveyed but none was found to be diverse.
- 4.4.95 The Kenilworth Greenway cuttings and embankments are now mainly wooded, although small patches of coarse grassland are present. This grassland is tall and rank, with a high proportion of herbaceous species. No other notable grassland areas have been surveyed.

Watercourses

- 4.4.96 Within this area, the following watercourses have been identified which are crossed by the Proposed Scheme:
- Warwickshire Avon (located west of Stoneleigh Park);
 - Finham Brook (tributary of the River Sowe, south east of Crackley and adjacent to Stoneleigh Road);
 - Canley Brook (east of Crackley and adjacent to Coventry Road); and
 - three unnamed tributary streams/drains of the Canley Brook (crossing near Birches Wood Farm, west of Broadwells Wood and south of Burton Green).
- 4.4.97 Watercourses within 100m of the area of land required for the construction of the Proposed Scheme that are not crossed by the Proposed Scheme include:
- five unnamed tributary streams/drains of the Warwickshire Avon.
- 4.4.98 In addition to rail route crossings, there are a number of Proposed Scheme road diversions and footpaths which would result in the following:
- road diversion crossing of an unnamed tributary stream/drain of the Warwickshire Avon (crossing south of Stoneleigh Park) (320m west);
 - footpath crossing of an unnamed tributary stream/drain of the Canley Brook (crossing east of Birches Wood Farm) (140m east); and
 - footpath crossing of an unnamed tributary stream/drain of the Canley Brook (adjacent to Broadwells Wood) (141m east).

Water bodies

- 4.4.99 The total number of ponds and ditches identified from aerial photography and OS maps within 500m of the area of land required for the construction of the Proposed Scheme is 160 of which 125 are ponds and 35 are ditches. This includes:
- 22 within the area of land required for the construction of the Proposed Scheme;

- 63 between 100m and the area of land required for the construction of the Proposed Scheme;
- 40 between 100m and 250m from the area of land required for the construction of the Proposed Scheme; and
- 35 between 250m and 500m of area of land required for the construction of the Proposed Scheme.

4.4.100 Of the ponds identified within 500m of the area of land required for the construction of the Proposed Scheme, 98 have been assessed for their Habitat Suitability Index (HSI) as part of great crested newt presence/absence surveys (further detailed information can be found within Volume 5: Appendix EC-002-003). Four of these were garden ponds in residential areas. Garden ponds are generally very small and often lined with synthetic materials and surrounded by gravel, ornamental shrubs or amenity grassland. Some of these were noted to contain species such as yellow iris (*Iris pseudacorus*) and water lily species (*Nymphaeaceae*). The rest of the ponds surveyed are within arable fields or semi-improved grasslands, often surrounded by bramble and nettle scrub.

Arable/cultivated land

4.4.101 The habitat audit data from Warwickshire Biological Records Centre and aerial photos show that this area is dominated by arable fields with occasional hedgerows and trees. The areas of farmland that were surveyed included areas of arable set-aside land but no species-rich arable margins were surveyed.

Buildings/structures

4.4.102 Within the area there is a low density of buildings within or adjacent to the area of land required for the construction of the Proposed Scheme. Eighteen buildings have been identified to be at risk of demolition within this area.

4.4.103 Most of these are isolated farmsteads, with the exception of buildings that are within the Stoneleigh Park complex. There are no large areas of residential properties within or adjacent to the area of land required for the construction of the Proposed Scheme. The town of Kenilworth lies outside of the 500m buffer.

4.4.104 Of those buildings that will be demolished a number have had an Extended Phase 1 habitat survey undertaken. These are buildings within Stoneleigh Park (formerly the National Agricultural Centre); New Kingswood Farm near Kenilworth Golf Course; a number of outbuildings near Crackley and Odnall End Farm, north west of Burton Green.

4.4.105 Within the land required for the construction of the Proposed Scheme, fifteen buildings not identified to be at risk of demolition have been subject to Extended Phase 1 habitat surveys. Within the 100m buffer of land required for the construction of the Proposed Scheme a further seventy seven buildings have been subject to Extended Phase 1 habitat surveys.

CFA19 Coleshill Junction

4.4.106 Access was obtained to approximately 76% of the area of land required for the construction of the Proposed Scheme and a 250m buffer from this boundary.

Woodland

- 4.4.107 Woodlands Cemetery and The Decoy woodland which are a contiguous block of woodland is north of the M42 motorway and west of the B4114 Birmingham Road. It is approximately 400m outside the area of land required for the construction of the Proposed Scheme and is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. No phase 1 habitat survey was undertaken within this woodland due to being outside the scope of the survey.
- 4.4.108 The Catmore, which is south west of Coleshill Manor office campus, is adjacent to the area of land required for the construction of the Proposed Scheme) and The Belt, which is northwest of Coleshill Manor office campus, is partly within area of land required for the construction of the Proposed Scheme). Both these are two contiguous woodlands that form a wooded strip north west of Coleshill Manor office campus, within Coleshill Park Belt LWS. The LWS also includes a strip of woodland along Green Lane within which has a hedgerow that has been identified as a historic hedgerow (see the Heritage Appendix section for further details of historic hedgerows). The sites contain lowland mixed deciduous woodland, a Habitat of Principal Importance. NVC surveys were carried out within these blocks of woodland.
- 4.4.109 To the north of the delta junction within the area of land required for the construction of the Proposed Scheme, near Jack o'Watton Business Park, there is a small area of secondary woodland and scrub. This broadleaved woodland was Phase 1 habitat surveyed and is a habitat of principal importance. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. It is located along the A446 between the A446 Litchfield Road and the Birmingham to Derby railway line.
- 4.4.110 A block of broadleaved woodland which was Phase 1 habitat surveyed supported ash, alder, and oak, interspersed with hawthorn, guelder rose and elder. This block of woodland is adjacent to A446 Lichfield Road and is located just outside of the area of land required for the construction of the Proposed Scheme.
- 4.4.111 There is a small semi-mature plantation woodland belt along Gorse Way near the A446 Lichfield Road just outside of the area of land required for the construction of the Proposed Scheme. This woodland was surveyed and the species noted include silver birch, field maple, ash, cherry, hazel and hawthorn with an understory dominated by ivy and common nettle.
- 4.4.112 There is also a plantation woodland belt adjacent to the Old Saltleians Rugby Club that was also Phase 1 habitat surveyed which is adjacent to B4117 Watton Lane and Watton House. This plantation is within the area of land required for the construction of the Proposed Scheme.
- 4.4.113 Another broadleaved woodland block which has been Phase 1 habitat surveyed is woodland adjacent to Coleshill Sewage Works and is adjacent to the area of land required for the construction of the Proposed Scheme. A dense understory supporting species such as bracken, holly, cherry laurel, elder, cherry, sycamore, goat willow, hazel and snowberry (*Symphoricarpos alba*) was noted. The ground flora layer included cow parsley (*Anthriscus sylvestris*), lords and ladies, germander speedwell

(*Veronica chamaedrys*) and common cleavers, foxglove, ground ivy, common nettle, elder, bramble, bluebell and Spanish bluebell.

Scrub

- 4.4.114 Scattered scrub within the Coleshill Junction area was mostly found *around* field edges, damp ditches and ponds. No large or notable areas of scrub habitat were recorded.

Hedgerows

- 4.4.115 Within this area, 146 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations²⁶. Of those that were surveyed, two qualified as an ecologically important hedgerow but only one is within the land required for the construction of the Proposed Scheme. This is just south of Gypsy Lane, south east of Water Orton and adjacent to the M42 motorway (see Section 8).
- 4.4.116 There are no hedgerows designated as LWS within 250m of the land required for construction of the Proposed Scheme. In addition two species rich hedgerows were also surveyed in this area but neither hedgerow was within the land required for construction of the Proposed Scheme.
- 4.4.117 Two types of hedgerows were recorded in the area: garden hedgerows and farmland hedgerows. Garden hedges were generally species poor and well maintained with little ecological importance. Species found included hawthorn, holly, elm, hazel, buddleia (*Buddleja davidii*), field maple, elder and ivy.
- 4.4.118 The majority of farmland hedges surveyed were species poor, generally contained gaps, had few mature trees and were hawthorn dominated. Other species found in some of the hedgerows included hazel, alder, field maple, blackthorn, holly, silver birch, ash, rose, willow, oak, and elder, interspersed with ivy, bramble and hop (*Humulus lupulus*).

Parkland and scattered trees

- 4.4.119 A small section of parkland with scattered trees was noted when reviewing the habitat audit data from Warwickshire Biological Records Centre, next to the River Tame and Coleshill Sewage Treatment Works but it has not been surveyed due to access restrictions.

Grassland

- 4.4.120 Lowland meadow, a habitat of principal importance, is present within the area surrounding Coleshill Manor office campus in a bend of the River Cole adjacent to Manor Lane. This is within the area of land required for the construction of the Proposed Scheme.
- 4.4.121 Three of these lowland meadow areas are designated as Local Wildlife Sites. Wheeley Moor Farm Meadows LWS (south west of the B4114 Birmingham Road and approximately 50m from the land required for the construction of the Proposed Scheme) and Coleshill Hall Farm LWS (adjacent to B114 Birmingham Road and within the land required for the construction of the Proposed Scheme) are floodplain grasslands alongside the River Cole. Coleshill Sewage Works Grassland LWS is located

partly within the area of land required for the construction of the Proposed Scheme. All three meadows have been subject to NVC survey (see Section 5). All qualify as Lowland Meadow, a habitat of principal importance.

- 4.4.122 NVC surveys were carried out at Coleshill Sewage Works Grassland LWS (see Section 5). This site consists of damp grassland south of the River Tame and within the floodplain. This site encompasses an area of land to the south of the River Tame, which is part of the Coleshill Sewage Works complex, but non-operational land. About 10ha is rush pasture, established around a seasonally wet drain that had expanded into a large water body at the time of survey. There are muddy, sparsely-vegetated banks surrounding this water body, and swamp vegetation has established in depressions that stay damp throughout the year. In the south-west of the site, there is mesotrophic grassland that is browsed by rabbits. There are small stands of young planted broad-leaved woodland that are fenced.
- 4.4.123 The rush pasture within the LWS is a dense tussocky structure dominated by soft rush (*Juncus effusus*), marsh bedstraw (*Galium palustre*), marsh thistle (*Cirsium palustre*) and water mint (*Mentha aquatica*). Other frequently occurring species include hairy sedge (*Carex hirta*), water forget-me-not (*Myosotis scorpioides*) and marsh willowherb (*Epilobium palustre*).
- 4.4.124 The western section of the LWS field is unmanaged grassland dominated by false oat grass (*Arrhenatherum elatius*). On the edges of this grassland, common nettle is locally dominant in association with false oat grass and creeping thistle (*Cirsium arvense*). Where there is localized browsing by rabbits on shallower soils, in the far western corner of this field bordering the A446 Lichfield Road, false oat grass is less dominant. Here, finer leaved grasses such as red fescue (*Festuca rubra*) and herbs including bird's-foot trefoil (*Lotus corniculatus*), yarrow (*Achillea millefolium*), black knapweed (*Centaurea nigra*) hare's-foot clover (*Trifolium arvense*) and red clover (*Trifolium pratense*) are locally abundant. In the depressions that remain moist there are patches of Yorkshire fog (*Holcus lanatus*), false oat grass, tufted hair grass (*Deschampsia cespitosa*) and common couch (*Elytrigia repens*). This grassland is associated with scattered small trees and scrub.

Watercourses

- 4.4.125 The following water courses are crossed by the Proposed Scheme:
- River Cole (crossing east of Coleshill Manor), two minor tributaries (Coleshill Hall Brook) and associated drain (near Gilson); and
 - River Tame (crossing near Coleshill Sewage Treatment Works) and two minor tributaries (one crossing near Coleshill Sewage Treatment works) and one which flows alongside the Proposed Scheme with multiple crossings west of Coleshill Industrial Estate.
- 4.4.126 The following watercourses fall within 100m of the area of land required for the construction of the Proposed Scheme but are not directly crossed by the Proposed Scheme:
- River Cole flows alongside the Proposed Scheme within the area of land required for the construction of the Proposed Scheme and the 100m buffer

east of Coleshill Hall Bridge; and

- four minor tributaries of the River Cole near B114 Birmingham Road both west of the Proposed Scheme and east of the Proposed Scheme; and

- 4.4.127 Three watercourses were surveyed within the Coleshill Junction area (see the river habitat survey and river corridor survey results section for more information) The first was a section of the River Tame which runs through Coleshill Sewage Treatment Works. The river was estimated to be more than 1m deep and approximately 15m wide with a moderately fast flow but little/no in-channel vegetation. The banks were covered in tall ruderal species with overhanging trees. Limited disturbance to the river was noted, however, there was limited connectivity to other habitats due to the adjacent land use (Sewage Treatment Works land).
- 4.4.128 Within the Coleshill Sewage Treatment Works, a culverted section of the River Tame was also surveyed. The water was flowing fast from west to east through the concrete sided culvert and assumed to have little ecological interest. There was no in-channel vegetation. However, the banks beyond the concrete sides supported tall ruderal species and trees.

Water bodies

- 4.4.129 The total number of ponds and ditches identified from aerial photography and OS maps within 500m of the area of land required for the construction of the Proposed Scheme is 90 of which 51 are ponds and 39 are ditches. This includes:
- 35 within the area of land required for the construction of the Proposed Scheme;
 - 34 between 100m and the area of land required for the construction of the Proposed Scheme;
 - 12 between 100m and 250m from the area of land required for the construction of the Proposed Scheme; and
 - 9 between 250m and 500m of area of land required for the construction of the Proposed Scheme.
- 4.4.130 Within the area, 73 water bodies have been assessed for their Habitat Suitability Index as part of great crested newt presence/absence surveys (further detailed information can be found within Volume 5: Appendix EC-002-003). Field ponds were generally surrounded by species-poor semi-improved grazed grassland. Aquatic emergent and marginal vegetation was rare but when present, it was predominantly common reed (*Phragmites australis*). The banks of the ponds were often heavily encroached and fringed with a mixture of scrub species, including hawthorn, willow, nettle, common cleavers, chickweed (*Stellaria media*), cow parsley, hazel, soft rush and gorse interspersed with elder shrubs and occasionally some mature trees such as oak or alder.
- 4.4.131 Other notable waterbodies within the area are the filtration lagoons in Coleshill Sewage Treatment Works and the flooded lagoon within Coleshill Sewage Works Grassland LWS.

Arable/cultivated land

- 4.4.132 The and habitat audit data from Warwickshire Biological Records Centre and aerial data show that the area within the area is a mixture of both dominated by arable fields with occasional hedgerows and trees and pasture land grazed by livestock. There were no species-rich arable margins identified in this area.

Buildings/structures

- 4.4.133 Eighteen buildings have been identified to be at risk of demolition within CFA19. Due to the more suburban environment within and around Coleshill and Water Orton the majority of these properties identified to be demolished are industrial or commercial buildings with occasional residential properties.
- 4.4.134 Both the towns of Coleshill and Water Orton lie within 100m of land required for the construction of the Proposed Scheme. A number of motorways are present within this area (M6, M6 Toll and M42) which also creates a much more urban and industrial setting.
- 4.4.135 Of those buildings that will be demolished, three have had a Phase 1 habitat survey undertaken. These are The Joinery (commercial property) south east of Coleshill Manor Office Campus; Parkway Sewers and Storage Units (industrial units) within the Hams Hall Distribution Park and 72 Attleboro Lane (residential property) near Water Orton.
- 4.4.136 Within the land required for the construction of the Proposed Scheme thirty eight buildings not identified to be at risk of demolition have been subject to Extended Phase 1 habitat surveys. Within the 100m buffer of land required for the construction of the Proposed Scheme a further sixty-six buildings have been subject to Extended Phase 1 habitat surveys.

CFA20 Curdworth to Middleton

- 4.4.137 Access was obtained to approximately 42% of the area of land required for the construction of the Proposed Scheme and a 250m buffer from this boundary.

Woodland

- 4.4.138 An unnamed plantation between Marston Land and the M42 is young (approximately 15 years old) with silver birch, hazel and field maple all dominant with the occasional Scots pine, and ash present. There is no ground flora present and the woodland is interspersed with mown pathways of poor semi-improved grassland. This woodland is within the area of land required for the construction of the Proposed Scheme. This plantation has had a Phase 1 habitat survey undertaken.
- 4.4.139 Hams Hall Woodland LWS comprises three woodlands, adjacent to the Birmingham and Derby railway line:
- Sych Wood, the north-easterly edge of this section of woodland, is within the land required for the construction of the Proposed Scheme. This woodland is classed as ancient semi-natural woodland. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. This section of woodland has not been surveyed due to lack of access.

- Church Pool Covert is east of the Birmingham and Derby line and is outside the land required for construction of the Proposed Scheme. This woodland has not been surveyed due to lack of access but is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance.
- Hams Lane Wood (also known as Birch Wood) is south west of the railway line and is within the land required for construction of the Proposed Scheme. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. Both a Phase 1 habitat and NVC survey have been undertaken within this woodland. There has been tree clearance undertaken for the railway line, electricity pylons and a sub-station. This has resulted in a scrub community dominated by bramble, with abundant wood sage (*Teucrium scorodonia*) and common nettle. The woodland community south of the railway covers a small area and has a canopy dominated by pedunculate oak and silver birch. Aspen is present, forming a stand of suckering trees, and there is coppice hazel and sweet chestnut, and ash. The woodland community shows signs of disturbance and succession changes and appears to have affinities to scrub communities as well as woodland of high nutrient situations.

- 4.4.140 Dunton Wood LWS, east of the Birmingham and Fazeley canal, is within 100m of the area of land required for the construction of the Proposed Scheme. This woodland lies parallel to the A4097 and is semi-natural ancient woodland and is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. No survey was undertaken at this woodland due to lack of access.
- 4.4.141 Mill Plantation and Lower Mill Plantation lie directly east of Marston surrounding the coarse fishing lakes at Cuttle Mill Fishery (former mill pools for Cuttle Mill), and is adjacent to the area of land required for the construction of the Proposed Scheme. This site consists of three connected ponds and woodland surrounded by arable fields and includes a stand of wet woodland, a habitat of principal importance. Mill Plantation is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. The area is low-lying and flat, and there are numerous ponds and lakes in the locality. The woodland within Cuttle Mill Fishery has had both a Phase 1 habitat and NVC survey undertaken (see Section 5).
- 4.4.142 Mill Plantation has a canopy of mixed ash, sycamore and alder. Aspen and crack willow (*Salix fragilis*) are locally frequent, but pedunculate oak is only occasional in the canopy. There is a very pronounced shrub layer. In the field layer bluebell is frequent throughout and locally abundant. Nine ancient woodland indicator species were recorded (see Section 5). This woodland is not listed as ancient woodland on the Natural England inventory and the names of Mill Plantation and Lower Mill Plantation suggest that they are of planted origin.
- 4.4.143 The Belfry golf course, along the A4091 is over 250m from the land required for the construction of the Proposed Scheme. Within the mosaic of habitats within the golf course are several small pockets of woodland such as The Shrubbery, Lower Lodge plantation and Lodge Coppice. Both The Shrubbery and Lodge Coppice are recognised as lowland deciduous woodland on the Natural England inventory of

habitats of principal importance. No surveys have been undertaken at this site due to lack of access.

- 4.4.144 North Wood LWS, located north-west of Cuttle Mill Fishery, and is within the area of land required for the construction of the Proposed Scheme. It is ancient semi-natural woodland and recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. The habitat within this woodland has not been surveyed due to a lack of access.
- 4.4.145 Coneybury Wood LWS is ancient replanted woodland and is 150m from the land required for the construction of the Proposed Scheme. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. The habitat within this woodland has not been surveyed due to a lack of access.
- 4.4.146 Larch Pit woodland is 100m from the land required for the construction of the Proposed Scheme. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. The habitat within this woodland has not been surveyed due to a lack of access.
- 4.4.147 Middleton Park woodland is 240m from the land required for the construction of the Proposed Scheme. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. The habitat within this woodland has not been surveyed due to a lack of access.
- 4.4.148 Pool-Head Plantation is within Middleton Pool SSSI and Middleton Pool LNR and the wider Middleton Park. It is adjacent to the land required for the construction of the Proposed Scheme. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance.
- 4.4.149 An NVC survey of Pool-Head Plantation has been undertaken. It is wet woodland that covers an area of approximately 2ha at the southwest corner of the lake, and there is a drier woodland strip along the south and west edge of the site. The wet woodland is dominated by crack willow, with frequent goat willow and alder. The shrub layer is sparse and comprises of elder and sprawling bittersweet, and the ground flora is composed of bittersweet, reed sweet-grass, marsh bedstraw and gypsywort indicative of wet ground conditions. The woodland strip along the south and west edge of the site is a drier woodland community comprising alder and crack willow as the dominant components of the canopy but associated with occasional pedunculate oak, sessile oak (*Quercus petraea*) and hazel with a developed shrub layer of hawthorn, holly and bramble. The ground flora is diverse in these areas and includes dog's mercury, wild garlic, wood anemone, greater stitchwort (*Stellaria holostea*), pignut and bluebell (see Section 5).
- 4.4.150 There is a cluster of three woodlands around Hunts Green, south of Middleton, which are all outside the area of land required for the construction of the Proposed Scheme but within 100m:
 - Roger's Coppice is ancient replanted woodland. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. This woodland has had a Phase 1 habitat survey undertaken;

- an unnamed broadleaved plantation woodland is north west of Roger's Coppice and south of Middleton. This woodland has been Phase 1 habitat surveyed. It is not listed on the Natural England inventory of habitats of principal importance as lowland deciduous woodland; and
- Walker's Spinney is west and adjacent to the land required for the construction of the Proposed Scheme. Walker's Spinney has been both Phase 1 habitat and NVC surveyed and the dominant canopy species is self-sown sycamore and alder, with standard mature pedunculate oak, occasional ash, beech, rowan and hazel. The shrub layer consists of elder, hawthorn and bramble, with guelder rose also present at low abundance (see Section 5).

Scrub

- 4.4.151 Scrub recorded within the area surveyed is generally a mixture of elder, bramble and hawthorn scrub mainly noted around field margins of improved grassland. There were no notable areas within the area of land required for the construction of the Proposed Scheme.
- 4.4.152 Within the area of land required for the construction of the Proposed Scheme at Coleshill Sewage Works, there is a small stand of willow scrub on the edge of an area of swamp that is dominated by grey willow (*Salix cinerea*) and white willow (*Salix alba*) with a low cover of common osier (*Salix viminalis*) and elder. This habitat is likely to be in transition from swamp to woodland and alder species may establish as this community develops.

Hedgerows

- 4.4.153 Within this area, 68 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations. Of those that were surveyed, 14 qualified as an ecologically important hedgerow but only six of these are within the land required for the construction of the Proposed Scheme (see Section 8).
- 4.4.154 There are no hedgerows designated as LWS within 250m of the land required for construction of the Proposed Scheme. In addition eight species rich hedgerows were also surveyed in this area of which one is within the land required for construction of the Proposed Scheme.
- 4.4.155 The majority of hedgerows surveyed were generally species-poor, being dominated by common hawthorn, with other species occurring infrequently including hazel, ash, holly, beech, wild cherry, oak, elm (*Ulmus minor*), field maple, blackthorn, elder, dogwood, honeysuckle, beech, sycamore, willow and rose. Many of the hedgerows contained occasional mature trees and were fairly dense with few gaps.

Parkland and scattered trees

- 4.4.156 Two large areas of amenity grassland with scattered broadleaved trees (both golf courses), one south of Middleton (The Belfry Golf Course) and the other west of Marston (Lea Marston Hotel Golf Course), can be seen from aerial imagery and Phase 1 habitat data from Warwickshire Biological Records Centre. Both of these are outside of the land required for the construction of the Proposed Scheme.

Grassland

- 4.4.157 Small areas of improved and semi-improved grassland were surveyed but none were found to be species rich or notable; these were arable set aside land or land used for grazing.
- 4.4.158 Curdworth Bridge Meadow is a parcel of grassland to the west of Coleshill Sewage Works that lies alongside the River Tame. This site does not appear to be intensively managed. An NVC survey was undertaken at this site (see Section 5).
- 4.4.159 Coleshill Sewage Treatment Works was surveyed as part of NVC surveys (see Section 5). This site contains a mosaic of vegetation communities that are semi-natural or have established on disused gravel settlement beds found in the north of the sewage works. There are approximately ten settlement beds in the west of the survey area that have lower bunds (approximately 1m high) and access paths between them are overgrown. The interior of each of these beds are dominated by grassland and tall ruderal vegetation indicative of high nutrient levels, and isolated areas that develop seasonal pools of water.
- 4.4.160 A small area of marshy grassland was surveyed as part of a Phase 1 habitat survey and is within the land required for the construction of the Proposed Scheme. It is found east of the scheme and north east of Roger's coppice.

Wetlands

- 4.4.161 Middleton Pool SSSI and Middleton Pool LNR are adjacent to the land required for the construction of the Proposed Scheme. The citation describes it as an area of large lakes bordered by an area of swampy wetland.

Watercourses

- 4.4.162 Watercourses within 100m of the area of land required for the construction of the Proposed Scheme include the River Tame, Birmingham and Fazeley Canal, Langley Brook, Gallows Brook and a number of unnamed tributary streams/drains.
- 4.4.163 Within the area, the following watercourses have been identified which are crossed by the Proposed Scheme:
- River Tame (crossing near Coleshill Sewage Treatment Works);
 - two minor tributaries of the River Tame;
 - Birmingham and Fazeley Canal (crossing near Maarston Lane Bridge);
 - Langley Brook (crossing near Cuttle Mill Fishery) and three small tributary streams/drains (near Middleton House Farm); and
 - Gallows Brook (tributary of Langley Brook) (crossing north east of Middleton).
- 4.4.164 Watercourses within 100m of the area of land required for the construction of the Proposed Scheme that are not crossed by the Proposed Scheme include four minor tributaries of Langley Brook (one of which is currently culverted under a sports recreation ground).
- 4.4.165 In addition to rail route crossings, there are a number of Proposed Scheme road diversions which would result in the following:

- road crossing of an unnamed tributary channel of the Middleton Hall Catch (tributary of the Langley Brook) (0.31km west);
- road crossing of an unnamed tributary channel of the Middleton Hall Catch (tributary of the Langley Brook) (0.11km west);
- road crossing of an unnamed tributary channel of the Langley Brook (0.08km west); and
- road crossing of the Langley Brook (0.2km East).

4.4.166 The River Tame forms the southern boundary of the area and the Proposed Scheme crosses the river at Coleshill Sewage Works. As part of the NVC survey the northern side of the river was surveyed at this point. This side of the river has steep banks covered with dense tall ruderal vegetation dominated by common nettle and bramble characteristic of a high nutrient environment. There is abundant Himalayan balsam (*Impatiens glandulifera*) and stands of lesser burdock (*Arctium minus*), hemlock (*Conium maculatum*), giant hogweed (*Heracleum mantegazzianum*) and rose-bay willowherb. Great mullein (*Verbascum thapsus*) and reed canary-grass (*Phalaris arundinacea*) are occasionally present within this vegetation.

4.4.167 An NVC survey was carried out on a stretch of the Birmingham and Fazeley Canal to the north-east of Curdworth between Marston Lane Bridge and White Bridge. This section is where the Proposed Scheme crosses Birmingham and Fazeley Canal (see Section 5). The canal in this stretch has a towpath on the eastern side that is alongside a canal bank with low vegetation kept short by mowing. This bank of the canal is partly supported by concrete and brick reinforcements, close to the locks and bridges for protection against mooring boats. The towpath is separated from neighbouring arable land and pasture by a hedgerow. The western bank of the canal has more natural vegetation, which is in places shaded by a strip of scrub, and in places more open with tall ruderal vegetation. Beyond this strip are arable fields.

4.4.168 A stream near Cuttle Mill Fishery was surveyed as part of a Phase 1 habitat survey. This stream is approximately 3m wide and 10cm deep, with a sluggish flow. It is shaded on its banks by common nettles, interspersed with cherry, goat willow (*Salix caprea*) and Leyland cypress shrubs.

Water bodies

4.4.169 The total number of ponds and ditches identified from aerial photography and OS maps within 500m of the area of land required for the construction of the Proposed Scheme is 140 of which 84 are ponds and 56 are ditches. This includes:

- 24 within the area of land required for the construction of the Proposed Scheme;
- 51 between 100m and the area of land required for the construction of the Proposed Scheme;
- 38 between 100m and 250m from the area of land required for the construction of the Proposed Scheme; and
- 27 between 250m and 500m of area of land required for the construction of the

Proposed Scheme.

4.4.170 Of the ponds identified within 500m of the area of land required for the construction of the Proposed Scheme, 78 have been assessed for their Habitat Suitability Index (HSI) as part of great crested newt presence/absence surveys (further detailed information can be found within Volume 5: Appendix EC-002-003).

4.4.171 The Phase 1 habitat survey information of a number of water bodies is summarised as follows:

- a disused sand and aggregate quarry at Middleton Hall Farm Quarry, is now ground water filled and contains many islands, with mostly bare ground around the lake edges but with some grasses and tall ruderal vegetation. Many waterfowl were present at the time of the survey;
- a small concrete-sided pond, likely to be a balancing pond, contains aquatic vegetation such as common duckweed (*Lemna minor*), yellow flag iris, water lily (*Nymphaea* sp.) and rosebay willowherb. The edge of the pond was surrounded by scrub and tall ruderal vegetation. This water body is 110m east of the area of land required for the construction of the Proposed Scheme; and
- the rest of the ponds surveyed were all field ponds. There were generally surrounded by mature trees and scrub (mainly bramble) or with reeds and rushes around the margins.

Arable/cultivated land

4.4.172 The majority of arable habitat is intensively managed right up to the field boundaries, leaving little space for semi-natural vegetation but tall ruderal vegetation was recorded within the majority of field margins surveyed. A small number of narrow field margins, north of Middleton and outside the land required for construction of the Proposed Scheme, were fairly species rich and contained lamb's quarters (*Chenopodium alba*), common groundsel, shepherd's purse (*Capsella bursa-pastoris*), field pansy (*Viola arvensis*), common cleavers (*Galium aparine*), scented mayweed (*Matricaria recutita*), creeping thistle (*Cirsium arvense*), fool's parsley (*Aethusa cynapium*), field bindweed (*Convolvulus arvensis*), spiny sowthistle (*Sonchus asper*), scarlet pimpernel (*Anagallis arvensis*), field forget-me-not (*Myosotis arvensis*), field cudweed (*Filago arvensis*) and red dead nettle (*Lamium purpureum*).

Buildings/structures

4.4.173 Within Curdworth to Middleton area there is a low density of buildings within or adjacent to the area of land required for construction of the Proposed. There are no large areas of residential properties within or adjacent to the Proposed Scheme.

4.4.174 Forty four buildings/structures identified to be at risk of demolition have been subject to initial Phase 1 assessment within this area.

Other habitats

4.4.175 Himalayan balsam, Japanese knotweed (*Fallopia japonica*), variegated yellow archangel and rhododendron have been recorded as part of Phase 1 habitat surveys.

These species are invasive non-native species and are listed on Schedule 9 of the Wildlife and Countryside Act (1981)³⁰ as plant species which are prohibited from being released into the wild. Himalayan balsam was found near Coleshill Sewage Treatment Works (within the area of land required for the construction of the Proposed Scheme), near Hunts Green which is outside the area of land required for the construction of the Proposed Scheme) and near Middleton, outside the area of land required for the construction of the Proposed Scheme. Both rhododendron and variegated yellow archangel was found within Cuttle Mill Fishery, outside the area of land required for the construction of the Proposed Scheme. Rhododendron was recorded north-west of Coleshill Sewage Treatment Works and within the area of land required for the construction of the Proposed Scheme. Japanese knotweed was recorded outside the area of land required for the construction of the Proposed Scheme, near Middleton.

CFA21 Drayton Bassett, Hints and Weeford

- 4.4.176 Access was obtained to approximately 62% of the area of land required for the construction of the Proposed Scheme and a 250m buffer from this boundary.

Woodland

- 4.4.177 Loddy Wood, north of Shirrall Hall Farm, is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. This woodland is outside the area of land required for the construction of the Proposed Scheme. No survey was undertaken at this woodland due to lack of access.
- 4.4.178 Shirall Coppice is west of Loddy Wood, just south of the A453. This woodland is semi-natural ancient woodland and is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. This woodland is more than 100m from the area of land required for the construction of the Proposed Scheme. No survey was undertaken at this woodland due to lack of access.
- 4.4.179 Brock Hurst woodland, is east of Brockhurst Farm and is over 100m west of the area of land required for the construction of the Proposed Scheme. This woodland is semi-natural ancient woodland and is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. No survey was undertaken at this woodland due to lack of access.
- 4.4.180 Roundhill Wood SBI is on an escarpment south of Hints village and is semi-natural ancient woodland. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. It is adjacent to the area of land required for the construction of the Proposed Scheme. This woodland has had an NVC survey undertaken (see Section 5). The structural variation of the wood is poor, with the majority of the trees even-aged. This woodland is dominated by a high forest canopy of even-aged sycamore, circa 20-25m tall. Remnants of the original native canopy are a minor constituent of the wood, and include pedunculate oak, ash, and birch, some of the latter present as standing dead wood. Rhododendron is dominant in the lower shrub layer and elsewhere Himalayan balsam is spreading along the path areas, particularly on the south-facing aspects.

³⁰ *Wildlife and Countryside Act 1981* (England and Wales) (as amended). Ch.69. Schedule 9 Part 2 Plants. Her Majesty's Stationary Office, London.

- 4.4.181 Rookery Wood SBI is north-west of Roundhill wood SBI and a north-easterly section of Rookery Wood is within the area of land required for the construction of the Proposed Scheme. The wood is ancient woodland is designated as a Staffordshire SBI. This woodland extends alongside Brockhurst Lane (known locally as Rookery lane) at the point where the Black-Bourne Brook flows under the lane. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. No survey was undertaken at this woodland due to lack of access.
- 4.4.182 Snake's Hill is west of Hints and is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. The woodland is on a slope on the north-eastern side of Black-Bourne Brook outside of the area of land required for the construction of the Proposed Scheme. It is not listed as ancient woodland in the Natural England inventory, but is present on the 1884 OS map. No survey was undertaken at this woodland due to lack of access.
- 4.4.183 Job's Hill is plantation woodland that is predominately coniferous, but has a small proportion of broadleaf trees. It is situated on higher ground above the Black-Bourne Brook, north of Rough Leasow. A north-easterly section of the wood is within the area of land required for the construction of the Proposed Scheme. It is not present on the 1884 OS map. No survey was undertaken at this woodland due to lack of access.
- 4.4.184 Rough Leasow SBI is a large area of ancient woodland, west of Job's Hill. An easterley section of this ancient woodland is also recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance (called Milditch Wood). This woodland is adjacent to the area of land required for the construction of the Proposed Scheme. No survey was undertaken at this woodland due to lack of access.
- 4.4.185 Moor Covert SBI is south-west of Packington Moor and is a strip of secondary mixed broadleaved and conifer woodland situated at the head of a stream that is surrounded by pasture and arable land. Although not ancient woodland, it is present on the 1884 OS map. A wet ditch crosses the woodland and joins up with a pond to the north. This woodland has had an NVC survey undertaken (see Section 5). This woodland is adjacent to the area of land required for the construction of the Proposed Scheme. The dominant canopy tree is planted sycamore that forms an even aged high canopy of up to 20m. Planted scots pine is also present. Remnants of the original canopy present include silver birch and occasional semi-mature pedunculate oak standards. The under storey is species poor and limited due to heavy shading of the high canopy. Rhododendron, elder and bramble are present in the shrub layer.
- 4.4.186 Within the area, five woodland areas have also been subject to Phase 1 surveys these are:
- small block of broadleaved woodland, near Hill Farm, north of Drayton Bassett;
 - a small coniferous plantation, near Bourne House, north of Hints;
 - small woodland block north of Bourne House, east of Weeford;
 - strip of broadleaved woodland, north east of Buck's Head Farm; and

- small plantation woodland near Flats Lane, Weeford.

4.4.187 Within these woodlands, the dominant species includes pine (*Pinus species*), oak, silver birch, sycamore, alder and beech. Other significant species include holly, ash, blackthorn, alder, rhododendron, elder, rowan, goat willow, hazel, hawthorn and Himalayan balsam. The ground flora consists of grasses including cock's foot (*Dactylis glomerata*), false-oat grass, common bent (*Agrostis capillaris*) and bluebell, ground elder (*Aegopodium podagraria*), ground ivy, common cleavers, cow parsley, wild garlic (*Allium ursinum*), common nettle, lesser celandine (*Ranunculus ficaria*), bramble, hogweed and various thistle species.

Scrub

4.4.188 The Staffordshire habitat audit survey data and aerial photography shows no large areas of notable scrub habitat. Within the area, as part of Phase 1 surveys, scrub (elder, common hawthorn and bramble) was found around amenity grassland edges, pond banks and arable field.

Hedgerows

4.4.189 Within this area, 130 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations²⁶. Of those that were surveyed, nine qualified as an ecologically important hedgerow but only four of these are within the land required for the construction of the Proposed Scheme (see Section 8).

4.4.190 Of the nine ecologically important hedgerows surveyed in this area, one hedgerow, Waggoner's Lane (hedge 1) SBI, also qualifies under the historical value criteria defined in The Hedgerow Regulations (1997) and is classed as ancient. This hedgerow is within the land required for the construction of the Proposed Scheme. It has had an NVC survey undertaken and it comprised common hawthorn and blackthorn with scattered pedunculate oak standards. Other woody species occasionally recorded included wild apple, hazel, elder and field maple.

4.4.191 In addition four species rich hedgerows were also surveyed in this area, none of which are within the land required for construction of the Proposed Scheme.

4.4.192 The majority of the other hedgerows surveyed formed boundaries between arable or semi-improved grassland fields. Species recorded include common hawthorn (which was the most dominant species), blackthorn, oak, dog rose, hazel, wild cherry, rowan, sycamore, wild privet (*Ligustrum vulgare*), elder, holly, alder, ash, elm (*Ulmus species*), crab apple, willow (*Salix species*), gorse, large-leaved lime (*Tilia platyphyllos*) and white poplar (*Populus alba*).

Grassland

4.4.193 Improved and semi-improved grassland were subject to Phase 1 surveys but none were found to be notable or species-rich.

4.4.194 Hints Meadow East is a field (2.2ha) adjacent to Snake's Hill (part of Snake's Hill, Oxbow and Black Brook SBI) and alongside the north-eastern bank of the Black Brook to the west of Hints. This was NVC surveyed (see Section 5) and the majority of the site is covered by a species-rich swamp surrounded by water-margin vegetation and

marshy grassland. On the higher slopes of the field there is improved grazing pasture and the grassland grades into woodland to the south-west alongside the brook, which has potential to be wet woodland. Potential wet woodland alongside the brook at Hints Meadow North is shown on the 1884 OS map as a fish pond, which has since been filled in. This grassland site is adjacent to the land the land required for the construction of the Proposed Scheme.

- 4.4.195 Hints Meadow West is adjacent to Job's Hill and includes the southern end of a pasture field on the opposite side of the Black-Bourne Brook from Hints Meadow East (part of the SBI). This grassland area has had an NVC survey undertaken. It is a wet flood plain meadow with a species rich community within a wider landscape of improved pasture fields. The wet meadow area is restricted to the eastern part of the field that borders the western side of the permanently wet ditch. The Brook denotes the far eastern boundary of this field. The northern end of the field is rush pasture, whilst the southern end of the field contains permanently wet runnels where swamp vegetation has established. The field is grazed and the wet areas are likely to be disturbed by sheep or cattle which maintain the open structure.
- 4.4.196 The vegetation community in the north eastern part of the field that borders the ditch is dominated by soft rush, Yorkshire fog and marsh foxtail (*Alopecurus geniculatus*). There is no standing water and the sward is species-poor. The only constant herbaceous species are creeping buttercup (*Ranunculus repens*) and broad-leaved dock (*Rumex obtusifolius*).
- 4.4.197 The lower lying south eastern side of the field that borders the wet ditch contains runnels of standing water up to 100mm deep. In these localised wet areas swamp vegetation has established with constant species including reed sweet grass and soft rush. There is a species rich assemblage of herbaceous species including water forget-me-not, gypsywort (*Lycopus europaeus*), water mint, brooklime and marsh bedstraw, which are frequent in abundance. The vegetation community on the banks of the ditch is dominated by reed canary grass, meadowsweet (*Filipendula ulmaria*) and purple loosestrife (*Lythrum salicaria*). The macrophytes within the ditch are limited to amphibious bistort (*Polygonum amphibium*), which has spread from the banks into the water column.

Watercourses

- 4.4.198 The Proposed Scheme crosses the following water courses within the area:
- Gallows Brook;
 - two minor tributaries of the Langley Brook; and
 - Black-Bourne Brook and three minor tributaries. There are three LWS along the Black-Bourne Brook: Black Brook Corridor: B.B. Bridge to Heart of England Way BAS is crossed by the Proposed Scheme, Ford (Oxbow Woodland) to Botley House, Bourne Brook Corridor BAS is immediately adjacent to the area of land required for the construction of the Proposed Scheme and downstream of the crossing, and Botley House to Bourne Bridge, Bourne Brook BAS which is outside of the area of land required for the construction of the Proposed Scheme and downstream of the crossing.

- 4.4.199 Black-Bourne Brook flows west to east and contained patches of pondweed in the channel. The embankments supported Himalayan balsam, common nettle, great willowherb (*Epilobium hirsutum*), reed canary grass, bulrush and brooklime;
- 4.4.200 A minor tributary of the Black-Bourne Brook with a fast flow over a pebbly substrate runs through a residential garden, adjacent to the area of land required for the construction of the Proposed Scheme.
- 4.4.201 A minor tributary of the Langley Brook flows parallel to the Proposed Scheme and is within the area of land required for the construction of the Proposed Scheme but is not crossed by the Proposed Scheme.

Water bodies

- 4.4.202 The total number of ponds and ditches identified from aerial photography and OS maps within 500m of the area of land required for the construction of the Proposed Scheme is 103 of which 72 are ponds and 31 are ditches. This includes:
- 21 within the area of land required for the construction of the Proposed Scheme;
 - 35 between 100m and the area of land required for the construction of the Proposed Scheme;
 - 20 between 100m and 250m from the area of land required for the construction of the Proposed Scheme; and
 - 27 between 250m and 500m of area of land required for the construction of the Proposed Scheme.
- 4.4.203 Of the ponds identified within 500m of the area of land required for the construction of the Proposed Scheme, 67 have been assessed for their Habitat Suitability Index (HSI) as part of great crested newt presence/absence surveys (further detailed information can be found within Volume 5: Appendix EC-002-003).

Arable/cultivated land

- 4.4.204 The Staffordshire habitat audit survey data and aerial photography show that the area within the Drayton Bassett, Hints and Weeford area is mainly arable fields with occasional hedgerows and trees.

Buildings/structures

- 4.4.205 Within Drayton Bassett, Hints and Weeford area there are a low density of buildings within or adjacent to the area of land required for the construction of the Proposed. Most of these are isolated farmsteads. There are no large areas of residential properties within or adjacent to the land required for construction of the Proposed Scheme.
- 4.4.206 Twenty four buildings within 100m of land required for the construction of the Proposed Scheme have been subject to initial Phase 1 assessments.

CFA22 Whittington to Handsacre

- 4.4.207 Access was obtained to approximately 40% of the area of land required for the construction of the Proposed Scheme and a 250m buffer.

Woodland

- 4.4.208 Whittington Barracks woodland was formerly part of Whittington Heath, as shown on the Ordnance Survey (OS) maps dating back to 1884. It is recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. The nearest section of woodland surrounding the Barracks is 150m from the area of land required for the construction of the Proposed Scheme. No survey was undertaken at this woodland due to lack of access.
- 4.4.209 Areas of broadleaved woodland within Whittington Heath Golf Course, a Site of Biological Importance (SBI) are recognised as lowland deciduous woodland on the Natural England inventory of habitats of principal importance. Part of the golf course is within the area of land required for the construction of the Proposed Scheme. Whittington Heath Golf Course has had a Phase 1 habitat survey and an NVC survey (see Section 5). The woodland is dominated by even aged pedunculate oak, with silver birch only occasionally recorded. The shrub layer is sparse and holly is generally only present on the periphery of the site. The ground flora is characterised by open grassy patches with Yorkshire fog and creeping soft-grass equally abundant. Wavy hair-grass, bracken, bluebell and broad buckler-fern are also scattered throughout, and in places locally abundant.
- 4.4.210 Fulfen Wood consists of two strips of woodland separated by an arable field. This site is marked on OS maps as far back as 1844 but (possibly due to its small size of less than 2ha) is not listed as ancient woodland on the Natural England inventory. It is within the area of land required for the construction of the Proposed Scheme. No survey was undertaken at this woodland due to lack of access.
- 4.4.211 Three plantation woodlands were Phase 1 habitat surveyed near Fradley Auction Centre. These three woodlands are within the land required for the construction of the Proposed Scheme:
- a small woodland belt was found to support poplar (*Populus* species), hawthorn, willow, ash, hazel, alder and oak;
 - a mix of deciduous and coniferous plantation woodland, including Leyland cypress and silver birch, sycamore, ash, oak (*Quercus* sp) and beech. The trees were all less than 30 years old. The understorey species included elder and the ground flora comprised mainly common nettle and hogweed; and
 - a plantation woodland containing semi-mature oak, field maple, sycamore and ash with an understorey of hawthorn and bramble with ground flora consisting of common nettle, cleavers, red campion, teasel, ground ivy, self heal and non-native Spanish bluebell.
- 4.4.212 Little Lyntus is a small woodland within an arable field which is not listed as ancient woodland or as lowland deciduous woodland on the Natural England Inventory, but is shown on the 1844 OS maps as woodland. No survey was undertaken at this woodland due to lack of access. This woodland is adjacent to the area of land required for the construction of the Proposed Scheme.
- 4.4.213 Big Lyntus SBI is ancient semi-natural woodland. It is also recognised in part as lowland deciduous woodland on the Natural England inventory of habitats of principal

importance. It has had an NVC survey (see Section 5) and the woodland is in part semi-natural (1.3ha) and part replanted with conifers (5.3ha). The northern compartment of the site is replanted woodland with a high canopy (up to 30m) dominated by semi-mature beech and Scots pine trees. Silver birch, pedunculate oak and rowan are also present at lower abundance. The shrub layer is patchy and consists of occasional holly and low growing bramble. Ground flora is limited to edges of the compartment or patches where there are gaps in the canopy, where bluebell, common nettle and cleavers are the most frequent species. This woodland is adjacent to the area of land required for the construction of the Proposed Scheme.

- 4.4.214 Fradley Wood and Fradley Gorse, Biodiversity Alert Site (BAS) are two blocks of woodland (previously one block) that are recognised as lowland mixed deciduous woodland on the Natural England inventory of habitats of principal importance. The most southern section of this woodland is within the land required for the construction of the Proposed Scheme. The woodland is adjacent to the eastern bank of the Trent and Mersey Canal. The site is made up of blocks of woodland and areas of scrub. Fradley Wood was formerly combined into a single wood, shown on the 1884 OS, but is now somewhat fragmented. Fradley Gorse was not part of the original woodland shown on the 1884 OS, and has therefore grown up since that date. The woodland is not listed as ancient woodland on the Natural England inventory.
- 4.4.215 A compartment of the woodland adjacent to the eastern bank of the canal was surveyed as part of the NVC survey (see Section 5). This compartment is known as Fradley Gorse. The woodland compartment is flat but intersected by a number of dry ditches and there is an abundance of fallen dead wood. Mature trees are spread out in the canopy approximately 20m apart, giving the woodland an open structure with a dense scrub layer and tall ruderal vegetation. The canopy is composed of frequent silver birch and pedunculate oak with occasional hazel and there are few individuals of hornbeam, holly and sessile oak. The shrub layer covers 50% of the compartment and is dominated by bramble, hawthorn, elder and honeysuckle. The ground flora has abundant broad buckler fern and male fern with occasional bracken, especially in clearings.
- 4.4.216 Woodend Lock SBI is a small deciduous woodland (approximately 1 ha) that is bordered by a small stream on its western boundary and which contains a steep-sided pond. It is located on the southern bank of the Trent and Mersey Canal at a bend in the canal near Woodend Lock. It is adjacent to the land required for the construction of the Proposed Scheme. The woodland is secondary in nature and is not classified as ancient woodland or as lowland mixed deciduous woodland on the Natural England inventory of habitats of principal importance.
- 4.4.217 The woodland has had an NVC survey (see Section 5) and includes a stand of wet woodland, which is a habitat of principal importance around a pond. A drier woodland community is present on the tall steep banks to the north and east of the woodland surrounding the pond and the areas to the south and west away from the pond. The wet woodland that surrounds the pond is dominated by alder and ash, which is frequent in the canopy with common nettle and ivy and the occasional hart's tongue fern (*Asplenium scolopendrium*) in the ground flora. Wetter depressions to the north-west of the pond contain crack willow up to 10m in height and large areas of bitter-cress (*Cardamine amara*), which is locally abundant with ground ivy. The pond is

heavily shaded and lacking in marginal vegetation. This site is situated at the location where the Curborough Brook flows under the canal. There are a number of pedunculate oak and mature ash trees present that are over 2m diameter at breast height, and there is a very large white poplar up to 35m in height.

- 4.4.218 Ravenshaw Wood (part of Ravenshaw, Black Slough and Slaish SBI) is recognised as lowland mixed deciduous woodland on the Natural England inventory of habitats of principal importance and is included within the Natural England inventory as ancient woodland. The most northerly section of the wood is within the land required for the construction of the Proposed Scheme. Ravenshaw Wood is situated approximately 4km north of Lichfield, alongside the Trent and Mersey Canal. The woodland has had an NVC survey (see Appendix EC-001-003 for more NVC details) and has a rather open, even aged canopy of pedunculate oak, with abundant downy birch (*Betula pubescens*) in the gaps between the oaks. Other canopy trees are rare, apart from isolated groups of alder or Scots pine trees. The shrub layer is very open but for a few large areas of mature rhododendron bushes, which have attained a height of up to 5m in places. Where rhododendron is present, it has excluded almost the entire ground flora beneath, but for a few moss species.
- 4.4.219 In the north-west of Ravenshaw Wood the ground is waterlogged. Here the canopy is similar to the rest of the wood, but there is a small area (less than 0.1ha) where tussocks of purple moor-grass are prominent in the ground flora and wavy hair-grass (*Deschampsia flexuosa*) is also present, particularly on a boundary bank that marks the eastern edge of the wood.
- 4.4.220 West of Ravenshaw Wood and connected to it via a strip of woodland alongside the southern bank of the Trent and Mersey Canal is Black Slough and the Slaish (part of Ravenshaw, Black Slough and Slaish SBI) woodland. They are recognised as lowland mixed deciduous woodland on the Natural England inventory of habitats of principal importance, and part of the woodland in the northern compartment, known as the Slaish, is ancient woodland. The remainder of the site is secondary woodland and former heathland or scrub, as indicated on the 1883 OS map. Black Slough and the Slaish are within the land required for the construction of the Proposed Scheme.
- 4.4.221 Black Slough and the Slaish has had an NVC survey (see Section 5) undertaken. The central area of Black Slough has abundant even aged downy birch and frequent pedunculate oak in the canopy. Similar to Ravenshaw Wood, there are large stands of mature rhododendron bushes and areas with an open shrub layer and abundant bracken. In the north of the site, north of the track that goes to Ravenshaw Cottage; the understorey is dominated by a dense rhododendron with one or two open glades. Rowan is scattered throughout, and holly, birch and oak saplings are also present.
- 4.4.222 Further north towards the canal, in the area known as the Slaish, the ground conditions become very wet and the canopy changes to a low shrub layer of grey willow with scattered crack willow. Alder is present alongside the canal. Rhododendron is also present. There are small pools and raised areas forming a mosaic of wet and drier conditions. The most noticeable characteristic of this habitat are cushions of bog mosses, including blunt-leaved bog-moss (*Sphagnum palustre*) and spiky bog-moss (*Sphagnum squarrosum*).

- 4.4.223 Tomhay Wood SBI is recognised as lowland mixed deciduous woodland on the Natural England inventory of habitats of principal importance, and is included within the Natural England inventory as ancient woodland. The woodland is adjacent to the land required for the construction of the Proposed Scheme. No survey was undertaken at this woodland due to lack of access.
- 4.4.224 Vicar's Coppice BAS is recognised as lowland mixed deciduous woodland on the Natural England inventory of habitats of principal importance, and is included within the Natural England inventory as ancient woodland. The woodland is adjacent to the land required for the construction of the Proposed Scheme. No survey was undertaken at this woodland due to lack of access.
- 4.4.225 Hanchwood House Woodlands includes three main woodland blocks and an area of scattered trees at Hanchwood House, Shaw Lane, east of Longdon. The three woodland blocks form John's Gorse SBI which is ancient woodland on the Natural England inventory and recognised as lowland mixed deciduous woodland on the Natural England inventory of habitats of principal importance. These three blocks of woodland are within the land required for the construction of the Proposed Scheme. The area of scattered trees is west of these blocks alongside the current West Coast Main Line and it is also a remnant of former ancient woodland (including John's Gorse), known as Hanch Wood, which is present on the 1884 OS map. This woodland belt is also within the land required for the construction for the Proposed Scheme.
- 4.4.226 The most northerly woodland block of John's Gorse SBI is 0.6ha in size and unfenced to cattle. The larger more southerly woodland block of John's Gorse (also known as Fox Covert) is 1.8 ha in size and has mature conifers and has the appearance of much disturbance in the past. Access to these two blocks was not obtained for detailed survey and observations were made from the field boundary.
- 4.4.227 However, an NVC survey was undertaken in the most southerly of the three woodland blocks that make up the SBI and is adjacent to Bourne Brook (see Section 5). This block of woodland consists predominantly of even-aged, pendunculate oak with some conifers from previous planting. There are a few older specimens of oak along the margins and a narrow belt of native alder along the stream, which also extends upstream towards the railway line. The site is very wet and subject to seasonal flooding in places. The closed canopy and the dominance of rhododendron and Himalayan balsam in the understorey together cast a heavy shade, allowing few other species to survive in the field layer. In the northern section there was better drainage and bluebell was abundant, with creeping soft-grass and some sparse dog's mercury. A single veteran field maple was present at the northern tip of the site, adjacent to the pond.
- 4.4.228 Harvey's Rough is a small woodland surrounded by arable land and bisected by the existing West Coast Main Line Railway. This site is shown as woodland on the 1884 OS map but is not recognised as lowland mixed deciduous woodland on the Natural England inventory of habitats of principal importance or is not included within the Natural England inventory as ancient woodland. The northern section of this woodland is within the land required for the construction of the Proposed Scheme. No survey was undertaken at this woodland due to lack of access.

Scrub

- 4.4.229 Scattered scrub such as hawthorn and blackthorn was recorded around field margins, upon earth bunds and along hard standing tracks. There were no large areas of scrub recorded.

Hedgerows

- 4.4.230 Within this area, 122 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations. Of those that were surveyed, five qualified as an ecologically important hedgerow, of which four are within the land required for the construction of the Proposed Scheme (see Section 8).
- 4.4.231 There are three designated hedgerows within 250m of the land required for construction of the Proposed Scheme:
- Curborough House (hedge 1) and Curborough House (hedge 4) Site of Biological Interest (SBI), which lies immediately adjacent to a road diversion associated with the Proposed Scheme. Both these hedgerows that make up the designation have been NVC surveyed (see Appendix EC-001-003 for more NVC details). This species-rich hedgerow is approximately 1.5m, has an associated dry ditch, mature standard trees and species-rich ground flora. The most dominant woody species in the hedgerow is hawthorn with bramble, elder, field maple and hazel frequent. Mature pedunculate oak standard trees (up to 20m high) are frequent approximately every 50m. There is a verge of herbaceous vegetation in front of the hedgerow with a high diversity of herbaceous species present some of which are woodland ground flora species. The dominant species in the verge are false oat-grass and cow parsley, with creeping thistle, common couch, cleavers, bracken, wood sage, common nettle, hedge woundwort and white bryony (*Bryonia dioica*) also present; and
 - Woodend Lane (hedge 1) BAS, which at its most westerly end is approx 160m south-west of the Proposed Scheme. Structurally the hedge is valued for its species rich canopy as it contains 14 hedge canopy species. The hedge had fourteen standard trees along its length and four young trees. The hedge also had a small ditch. This hedge has species such as gorse, hazel, crab apple and both black and white bryony. It has not been Phase 1 habitat or NVC surveyed.
- 4.4.232 Of the ecologically important hedgerows surveyed in this area, there are no surveyed hedgerows that also qualify under the historical value criteria defined in The Hedgerow Regulations (1997).
- 4.4.233 In addition 18 species rich hedgerows were also surveyed in this area of which four are within the land required for construction of the Proposed Scheme.
- 4.4.234 A large number of hedgerows along the boundaries of private gardens were surveyed and comprised species such as plum (*Prunus* sp), silver birch, Leyland cypress, common hawthorn, hornbeam (*Carpinus betulus*), sycamore, laurel, dogwood, snowberry, *pyracantha* sp and hazel.
- 4.4.235 The remaining hedgerows generally bordered arable fields, woodlands, semi-improved grasslands and sections of canal. These hedgerows comprised of hawthorn,

alder, ash, elder, blackthorn, rose (*Rosa species*), oak, hazel, willow, silver birch, holly, dog rose, birch, elm (*Ulmus species*), field maple and bracken. Common hop was also recorded occasionally.

Grassland and marsh

- 4.4.236 Twenty eight small areas of improved and semi-improved grassland were surveyed but none were found to be species rich. These are arable set aside land or land used for grazing.

Watercourses

- 4.4.237 The following water courses are crossed by the Proposed Scheme:
- Wyrley and Essington Canal (disused canal);
 - Mare Brook (tributary of the River Tame) and three minor tributaries of the Mare Brook;
 - Trent and Mersey Canal, which also flows alongside the Proposed Scheme within 100m of the area of land required for the construction of the Proposed Scheme (part of this site is an SBI);
 - Curborough Brook;
 - Bourne Brook;
 - seven drains are expected to be crossed within the area;
 - the following fall within 100m of the area of land required for the construction of the Proposed Scheme but are not directly crossed by the Proposed Scheme:
 - Coventry Canal; and
 - eight minor tributaries and drains.
- 4.4.238 Watercourses included in Phase 1 surveys include 12 sections of canal, four ditches and a stream through a residential garden:
- 4.4.239 Phase 1 habitat surveys have been carried out on the Trent and Mersey Canal, the Coventry Canal, and the Wyrley and Essington (disused) Canal. Canal sections are generally bordered by a mixture of amenity grassland and scrub and occasionally the banks are reinforced with sheet piling. Semi-natural vegetation including hawthorn, oak, silver birch, pine, stitchwort (*Stellaria species*), common nettle, cow parsley, common dog violet and red campion has been found along the banks. Marginal vegetation includes yellow flag iris mixed with reed canary grass and meadowsweet.
- 4.4.240 Two of the ditches (one near East Hill, the other near Wood End Lane) were adjacent to hedgerows. Bank side vegetation was predominantly dock (*Rumex species*) and common nettle with bramble and water starwort (*Callitriche species*). The in-channel vegetation was limited with localised areas of duckweed;
- 4.4.241 The other two ditches (both near Streethay) ran through semi-improved grassland fields. The fast flowing ditches both had steep banks, one with limited vegetation including ground ivy, wild garlic, common reed and wild mustard (*Alliaria petiolata*);

and the other overgrown with rosebay willowherb and occasional willow trees. Both contained limited aquatic vegetation although water mint was noted.

- 4.4.242 An NVC survey was undertaken at the Trent and Mersey canal near Fradley. This is part of King's Bromley Wharf to Fradley Jn, Coventry Canal SBI (see Appendix EC-001-003 for more NVC details). This section of canal experiences sluggish flow rates and has a heavily silted water column from the frequent boat traffic, which precludes the establishment of vegetation within the water column. The canal is sheet piled along this section and marginal vegetation is limited to a thin strip under 1m wide where the vegetation is not mown for the tow path. The trees, alder and silver birch, extend right up to the water's edge on the southern bank, which has precluded any marginal vegetation from establishing. The vegetation community is from the towpath on the northern bank, which has light shading from adjacent woodland areas. The narrow vegetation community that has established along the edge of the canal covers approximately 80% of the northern bank and is between 1-2m in height.
- 4.4.243 The Trent and Mersey canal at Handsacre has also had an NVC survey (see Appendix EC-001-003 for more NVC details). This section of the canal is turbid and heavily affected by disturbed silt (similar to the canal section at Fradley) and as a consequence has very few aquatic plants. The canal is sheet piled and marginal vegetation is limited to a thin strip under 1m wide where the vegetation is not mown for the tow path. Where trees extend right up to the canal edge there is little marginal vegetation. The vegetation on the northern bank is more developed as there is only light shading from adjacent woodland. The marginal vegetation community on the edge of the canal covers is between 1-2m in height. Meadowsweet is constant and often abundant with wild angelica, cow parsley, gypsywort, common nettle and broad buckler fern frequent. Other associated species that are occasional or locally abundant included hemp agrimony, yellow iris, skullcap and marsh woundwort.

Water bodies

- 4.4.244 The total number of ponds and ditches identified from aerial photography and OS maps within 500m of the area of land required for the construction of the Proposed Scheme is 174 of which 109 are ponds and 65 are ditches. This includes:
- 45 within the area of land required for the construction of the Proposed Scheme;
 - 52 between 100m and the area of land required for the construction of the Proposed Scheme;
 - 43 between 100m and 250m from the area of land required for the construction of the Proposed Scheme; and
 - 34 between 250m and 500m of area of land required for the construction of the Proposed Scheme.
- 4.4.245 Of the ponds identified within 500m of the area of land required for the construction of the Proposed Scheme, 94 have been assessed for their Habitat Suitability Index (HSI) as part of great crested newt presence/absence surveys (further detailed information can be found within Volume 5: Appendix EC-002-003).

- 4.4.246 Field ponds were recorded with shallow margins and supporting yellow flag iris. Surrounding the ponds was scattered scrub of brambles, nettles, common cleavers and thistle with occasional trees; aspen, oak, common hawthorn.
- 4.4.247 Garden ponds were often surrounded by amenity grassland. They were found to contain ornamental planted species such as floating water fern (*Azolla species*), water lily and fringed with irises (*Iris species*) and soft rush. Duckweed was occasionally found on the surface.
- 4.4.248 A brick built ornamental garden pond with vertical banks supported a dense Koi carp population and contained managed ornamental sedges and water lily (near Dranford Lane).
- 4.4.249 Woodland ponds were generally surrounded by species such as sycamore, oak, elder, and beech. A drain from the Trent and Mersey canal had formed a woodland pond within Woodend Lock LWS. Steep banks were covered in ivy, wild garlic and common nettle with trees overhanging the pool and channel, bordered by hawthorn, sycamore, ash, elder and oak.

Heathland

- 4.4.250 Whittington Heath Golf Course SBI is recognised as an area of lowland heath with stands of deciduous woodland, both of which are habitats of principal importance. Part of the golf course is within the land required for the construction of the Proposed Scheme. The site was formerly a single block of heathland known as Whittington Heath. This is shown on the OS map as far back as 1844. The heath in open areas of woodland was predominantly young heather (*Calluna vulgaris*), with some gorse. A narrow strip of heath along the golf course was dominated by heather interspersed with strips of dry grassland and occasional gorse. There are also patches of heath dominated by heather in locations where mowing is less frequent, or in inaccessible areas such as very steep banks.
- 4.4.251 Also within Whittington Heath Golf Course there are patches and strips of acid grassland, in particular at the edges of the fairways, and in undeveloped locations of the site.
- 4.4.252 No other heathland areas have been identified within the area.

Arable/cultivated land

- 4.4.253 The Staffordshire habitat audit survey data and aerial photography show that the area within the area is dominated by arable fields with occasional hedgerows and trees.

Buildings/structures

- 4.4.254 Within Whittington to Handsacre area there is a low density of buildings within or adjacent to the area of land required for the construction of the Proposed. There are no large areas of residential properties within or adjacent to the Proposed Scheme.
- 4.4.255 Initial assessments of 32 buildings and/or structures currently identified to be at high risk of demolition were undertaken. No buildings and or structures were subjected to an initial assessment within the land required for the construction of the Proposed Scheme.

- 4.4.256 Eighty four buildings and/or structures within 100m of land required for the construction of the Proposed Scheme subjected to initial assessments.

5 National vegetation classification

5.1 Introduction

- 5.1.1 This section of the appendix details National Vegetation Classification³¹ (NVC) baseline data relevant to the section of the Proposed Scheme that will pass through CFA16 to CFA22 inclusive.

5.2 Methodology

- 5.2.1 Details of the standard methodology utilised for NVC survey are provided in Ecology technical note: Ecological field survey methods and standards (Volume5: Appendix CT-001-000/2).
- 5.2.2 The computer programme MATCH³², created by the Unit of Vegetation Science at the University of Lancaster, was used to provide additional analysis. A similarity coefficient was generated for each classification which provided a 'goodness to fit' of a sample set from a homogenous stand of vegetation to the published NVC community species lists.
- 5.2.3 Details of the locations where NVC survey was conducted are provided in Table 5 and in Volume 5: Map Book – Ecology, Maps EC-10. Sites for NVC survey were identified as those that are within 100m of the land required for the construction of the Proposed Scheme and either: was included within a designated site or potential designated site; may have included a habitat of principal importance; was likely to contain habitats of particular interest or rare plant species; or, supported extensive wetland areas.
- 5.2.4 A total of 77 sites were surveyed to NVC within CFA16 to CFA22 inclusive as shown in Table 5.

Table 5: Summary of NVC surveys undertaken within CFA16 to CFA22 inclusive

Ecology survey code	NVC survey site name	Location	OS grid reference	Habitat types included in survey	Survey date	CFA	Distance from the land required for construction of the Proposed Scheme ³³ (m) and orientation
030-PH2-118001	Oxford Canal	Wormleighton	SP450551	Standing water, marginal vegetation	26 July 2012	CFA16	Within land required
030-PH2-122001	Field at Withy Tree Farm (Ladbroke Meadows)	Ladbroke	SP424589	Grassland	30 May 2013	CFA16	Within land required
030-PH2-123002	Windmill Hill Spinney	Ladbroke	SP424592	Woodland, scrub	20 July 2012	CFA16	Within land required

³¹ NVC is a detailed survey and classification system that is used to compare plant communities with a range of defined community types.

³² Malloch, A.J.C. (1998), MATCH Version 2. University of Lancaster.

³³ Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'.

Ecology survey code	NVC survey site name	Location	OS grid reference	Habitat types included in survey	Survey date	CFA	Distance from the land required for construction of the Proposed Scheme ³³ (m) and orientation
030-PH2-124001	Southam Road Verge, Ladbroke	Ladbroke	SP417595	Grassland, hedgerow	11 October 2012	CFA16	Within land required
030-PH2-123001	Field North of Ladbroke	Ladbroke	SP418596	Grassland	11 October 2012	CFA16	Within land required
030-PH2-126001	Hill Farm Wood, north of A425 Leamington Road Verge near to Thorpe Bridge, Southam	Southam	SP405615	Woodland, pond	05 June 2013	CFA16	Immediately north of land required
030-PH2-127001	Long Itchington and Ufton Woods SSSI	Bascote Heath	SP389628	Woodland	15 May 2013	CFA16	Proposed Scheme passes in tunnel beneath SSSI
030-PH2-129001	Grand Union Canal	Offchurch	SP383639	Standing water, marginal vegetation	26 July 2012	CFA17	Within land required
030-PH2-131001	Offchurch Greenway	Offchurch	SP369658	Woodland	12 October 2012	CFA17	Within land required
030-PH2-132001	Ash Beds	Offchurch	SP364666	Woodland	21 July 2012	CFA17	Within land required
030-PH2-133001	River Leam	Offchurch	SP358675	Running water, marginal vegetation	29 May 2013	CFA17	Within land required
030-PH2-135001	South Cubbington Wood North-west	Cubbington	SP350689	Woodland	20 July 2012	CFA17	Within land required
030-PH2-135002	South Cubbington Wood North	Cubbington	SP352689	Woodland	04 July 2012	CFA17	50m north-east
030-PH2-135003	Broad Oaks Wood (part of South Cubbington Wood)	Cubbington	SP352691	Woodland	05 June 2013	CFA17	20m north-east
030-PH2-138001	Stoneleigh Park East	Stareton	SP332707	Woodland, pond	04 June 2013	CFA18	Within land required
030-PH2-138006	Stareton Woodland 2	Stareton	SP333716	Woodland	28 August 2012	CFA18	150m north-east
030-PH2-138007	Stareton Woodland 1	Stareton	SP332714	Woodland	29 August 2012	CFA18	Within land required
030-PH2-139006	Stoneleigh Park Woodland 3 (Gilbert's Spinney)	Stoneleigh	SP327719	Woodland	13 August 2012	CFA18	Within land required

Ecology survey code	NVC survey site name	Location	OS grid reference	Habitat types included in survey	Survey date	CFA	Distance from the land required for construction of the Proposed Scheme ³³ (m) and orientation
030-PH2-139005	Stoneleigh Park Woodland 1	Stoneleigh	SP320719	Woodland	13 August 2012	CFA18	170m south-west
030-PH2-139004	Stoneleigh Park Woodland 2	Stoneleigh	SP324721	Woodland	13 August 2012	CFA18	immediately north-east of land required
030-PH2-139001	Stoneleigh Park Woodland 4	Stoneleigh	SP320721	Woodland	13 August 2012	CFA18	Within land required
030-PH2-139003	Stoneleigh Park Woodland 7	Stoneleigh	SP324724	Woodland	14 August 2012	CFA18	20m north-west
030-PH2-139002	River Avon	Stoneleigh	SP321722	Running water, marginal vegetation	04 June 2013	CFA18	Within land required
030-PH2-140001	Stoneleigh Park Woodland 5	Stoneleigh	SP319723	Woodland	14 August 2012	CFA18	Within land required
030-PH2-140002	Stoneleigh Park Woodland 6	Stoneleigh	SP316721	Woodland	14 August 2012	CFA18	Within land required
030-PH2-143003	Crackley Farm Pond	Crackley	SP293741	Woodland, pond	29 May 2013	CFA18	Immediately east of land required
030-PH2-143002	Crackley Wood North	Crackley	SP289742	Woodland	04 July 2012	CFA18	120m south-west
030-PH2-143001	Birches Wood	Crackley	SP291745	Woodland	01 August 2012	CFA18	Within land required
030-PH2-143004	Birches Wood Plantation	Crackley	SP289746	Woodland	03 July 2012	CFA18	Within land required
030-PH2-144002	Roughknowles Wood	Crackley	SP288748	Woodland	03 July 2012	CFA18	Within land required
030-PH2-146001	Kenilworth Greenway South	Crackley	SP279749	Woodland	27 July 2012	CFA18	Within land required
030-PH2-144001	Broadwells Wood	Burton Green	SP281752	Woodland	16 May 2013	CFA18	Within land required
030-PH2-146002	Black Waste Wood	Burton Green	SP272760	Woodland	30 May 2013	CFA18	Within land required
030-PH2-146005	Black Waste Wood South	Burton Green	SP271758	Woodland	03 July 2012	CFA18	Within land required
030-PH2-146004	Kenilworth Greenway North	Burton Green	SP265762	Woodland	27 July 2012	CFA18	Within land required
030-PH2-146003	Little Poors Wood	Burton Green	SP268758	Woodland	29 May 2013	CFA18	Within land required
030-PH2-161003	Wheeley Moor Farm Meadows	Coleshill	SP188879	Grassland	06 June 2013	CFA19	Within land required

Ecology survey code	NVC survey site name	Location	OS grid reference	Habitat types included in survey	Survey date	CFA	Distance from the land required for construction of the Proposed Scheme ³³ (m) and orientation
030-PH2-160001	Coleshill Hall Farm Meadows	Coleshill	SP191880	Grassland	07 June 2013	CFA19	Within land required
030-PH2-161002	Field North-East of Hall Walk	Coleshill	SP192883	Grassland	12 June 2013	CFA19	Within land required
030-PH2-161004	River Cole and Meadows	Coleshill	SP188885	Grassland	03 June 2013	CFA19	Within land required
030-PH2-162002	Field North of South Drive	Coleshill	SP190891	Grassland	03 June 2013	CFA19	Within land required
030-PH2-163002	The Catmore	Coleshill	SP182893	Woodland	31 May 2013	CFA19	Immediately south-west of land required
030-PH2-162001	The Belt	Coleshill	SP185897	Woodland	31 May 2013	CFA19	Within land required
030-PH2-163003	Green Lane, Coleshill	Coleshill	SP183898	Hedgerow	11 October 2012	CFA19	Within land required
030-PH2-163001	Dodder's Oak, Gilson ³⁴	Gilson, near Coleshill	SP189901	Veteran tree	28 June 2013	CFA19	Within land required
030-PH2-164001	Coleshill Sewage Works Grassland	Water Orton	SP189914	Marshy grassland, swamp	20 September 2012	CFA19	Within land required
030-PH2-164003	Curdworth Bridge Meadow South	Water Orton	SP187917	Grassland	06 September 2012	CFA19	110m west
030-PH2-164006	River Tame	Water Orton	SP189916	Running water, marginal vegetation	17 August 2012	CFA19	Within land required
030-PH2-164005	Coleshill Sewage Works West	Water Orton	SP190917	Tall ruderal, grassland, swamp	17 August 2012	CFA20	Within land required
030-PH2-164004	Coleshill Sewage Works East	Water Orton	SP193915	Tall ruderal, grassland, swamp	17 August 2012	CFA20	Within land required
030-PH2-164002	Curdworth Bridge Meadow North	Water Orton	SP188918	Grassland	06 September 2012	CFA20	Within land required
030-PH2-165007	Hams Lane Wood South	Lea Marston	SP196923	Woodland	11 October 2012	CFA20	Within land required

³⁴ The 'Dodder's Oak' at Gilson is a veteran pedunculate oak tree that was surveyed to verify its location and species as part of the Phase 2 NVC surveys. It is identified as a potential Local Wildlife Site in Warwickshire. The vernacular name came from a local resident and tenant of the field in which it grows.

Ecology survey code	NVC survey site name	Location	OS grid reference	Habitat types included in survey	Survey date	CFA	Distance from the land required for construction of the Proposed Scheme ³³ (m) and orientation
030-PH2-165008	Hams Lane Wood North	Lea Marston	SP196925	Woodland	10 October 2012	CFA20	Within land required
030-PH2-167001	Birmingham and Fazeley Canal	Marston	SP192947	Standing water, marginal vegetation	16 August 2012	CFA20	Within land required
030-PH2-168001	Cuttlemill Fishery Plantation	Wishaw	SP190950	Woodland	01 September 2012	CFA20	Within land required
030-PH2-171004	Langley Brook	Middleton	SP185981	Running water, marginal vegetation	07 May 2013	CFA20	Within land required
030-PH2-171003	Walker's Spinney	Middleton	SP183982	Woodland	07 May 2013	CFA20	Within land required
030-PH2-171002	Park Gate Farm Pond	Middleton	SP186982	Pond, marginal vegetation	07 May 2013	CFA20	Immediately west of land required
030-PH2-171001	Middleton Pool SSSI	Middleton	SP190982	Woodland	10 June 2013	CFA20	Within land required
030-PH2-175001	Waggoner's Lane Hedgerow	Hints	SK161014	Hedgerow	10 October 2012	CFA21	Within land required
030-PH2-176001	Roundhill Wood	Hints	SK158023	Woodland	01 August 2012	CFA21	Within land required
030-PH2-177002	Hints Meadow East	Hints	SK155030	Marshy grassland	11 June 2013	CFA21	Within land required
030-PH2-177003	Hints Meadow West	Hints	SK153031	Marshy grassland	21 September 2012	CFA21	Within land required
030-PH2-179001	Moor Covert	Packington Moor	SK145054	Woodland	21 September 2012	CFA21	Immediately north-west of land required
030-PH2-181001	Whittington Heath Golf Course	Whittington	SK147076	Woodland	24 May 2012	CFA22	Within land required
030-PH2-187001	Curborough House Hedgerow	Fradley	SK135129	Hedgerow	10 October 2012	CFA22	Within land required
030-PH2-187002	Big Lyntus	Fradley	SK131130	Woodland	08 May 2013	CFA22	Adjacent to land required
030-PH2-187003	Fradley Wood	Fradley	SK136134	Woodland	08 May 2013	CFA22	Within land required

Ecology survey code	NVC survey site name	Location	OS grid reference	Habitat types included in survey	Survey date	CFA	Distance from the land required for construction of the Proposed Scheme ³⁵ (m) and orientation
030-PH2-188002	Trent and Mersey Canal, Fradley	Fradley	SK127137	Standing water, marginal vegetation	09 October 2012	CFA22	Within land required
030-PH2-188001	Woodend Lock	Fradley	SK131132	Woodland, pond	07 September 2012	CFA22	Immediately west of land required
030-PH2-188003	Ravenshaw Wood	Elmhurst	SK124137	Woodland	07 June 2012	CFA22	Within land required
030-PH2-189001	Black Slough and Slaish	Elmhurst	SK118140	Woodland	07 June 2012	CFA22	Within land required
030-PH2-190002	Hanchwood House Woodland 1 adjacent to Bourne Brook	Longdon Green	SK108140	Woodland	02 August 2012	CFA22	Within land required
030-PH2-190001	Johns Gorse 1 ³⁵	Longdon Green	SK107141	Woodland	02 August 2012	CFA22	Within land required
030-PH2-190003	Johns Gorse 2 (Fox Covert) ³⁵	Longdon Green	SK106142	Woodland	02 August 2012	CFA22	Within land required
030-PH2-190004	Hanchwood House Woodlands 2 ³⁵	Longdon Green	SK104142	Woodland	02 August 2012	CFA22	Within land required
030-PH2-192001	Trent and Mersey Canal, Handsacre	Handsacre	SK097156	Standing water, marginal vegetation	09 October 2012	CFA22	140m east

5.3 Deviations, constraints and limitations

- 5.3.1 No deviations to the standard methodology were applied, and subject to the constraints and limitations identified in the following section, all surveys were conducted as per the standard methodology provided in the Ecology technical note: Ecological field survey methods and standards (Volume5: Appendix CT-001-000/2).
- 5.3.2 Access was limited to a number of sites within 100m of the land required for the construction of the Proposed Scheme where NVC survey was proposed. However it is estimated that approximately 63% of the sites proposed for NVC were surveyed, including a representative variety of habitats found within CFA16 to CFA22.
- 5.3.3 NVC survey is limited by factors which affect the presence of plants such as the time of year and general weather conditions. Therefore the NVC survey may not produce a complete list of plants at a site and the absence of evidence of any particular species

³⁵ Surveyed from distance and not to full NVC level due to access restricted by presence of livestock.

should not be taken as conclusive proof that the species is not present or that it will not be present in the future. Nevertheless, the results of these surveys permit an assessment of the ecological value of habitats for vegetation communities.

- 5.3.4 In line with the published guidance³⁶, the MATCH assessments were not used in isolation; a combination of the keys and descriptions within the published NVC handbooks, MATCH assessment, and surveyor experience was used to determine vegetation community types.
- 5.3.5 The coefficient of similarity generated by MATCH (calculated as a percentage) was used to improve the confidence with which data collected could be assigned to a particular NVC community. As a rough guide, MATCH coefficients below 40% were considered to represent particularly poor fits, while those of 50% or over were considered particularly good fits. Coefficients between 40 and 49% inclusive were not considered to provide a result with confidence, and in these cases, the published keys and descriptions, plus surveyor experience were favoured methods. In some cases, even particularly good fits for MATCH assessments were treated with caution where the result was not considered to be a true reflection of the existing vegetation community by the surveyor.

Table 6: Summary of locations in CFA16 to CFA22 inclusive where requirement for NVC survey was identified but no access was available for survey

Survey site name	Location	OS grid reference	Description of proposed survey location ³⁷	CFA	Distance from the land required for construction of the Proposed Scheme ³⁸ (m) and orientation
Berryhill Plantation	Stoneton, south of Priors Hardwick	SP463539	Woodland on east of road	CFA16	Within land required
Woodland around fish ponds at Lower Radbourne	Upper Radbourne Farm, near Chapel Bank Cottage, south-east of Ladbroke	SP440569	Wet woodland surrounding fish ponds	CFA16	Within land required
Ladbroke Fox Covert	East of Ladbroke	SP429582	Woodland	CFA16	Within land required
Hill Farm Wood South	South of the A425 Leamington Road near Thorpe Bridge, (Hill Farm Wood), west of Southam	SP403614	Woodland strip on south side of road	CFA16	Within land required
Hill Farm Wood North	North of A425 Leamington Road verge along the River Itchen, west of Southam	SP402615	Watercourse 100m either side of Proposed Scheme	CFA16	Within land required
Thorpe Rough	Bascote Heath, south of Welsh Road	SP400625	Woodland	CFA16	Immediately east of land required

³⁶ Rodwell, J.S. (2006), National Vegetation Classification: Users' handbook. Joint Nature Conservation Committee, Peterborough.

³⁷ Where a description of the habitat is given with no limit to the survey area specified, the survey will extend to the limits of the habitat at that location, usually a discrete habitat parcel (such as a woodland).

³⁸ Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'.

Survey site name	Location	OS grid reference	Description of proposed survey location ³⁷	CFA	Distance from the land required for construction of the Proposed Scheme ³⁸ (m) and orientation
Bascote Heath Wood	At the eastern side of Long Itchington Wood	SP392624	Woodland	CFA16	Proposed Scheme runs in a tunnel beneath site
Woodland near Longhole Bridge on the Grand Union Canal	South of the Grand Union Canal between Longhole Bridge and Welsh Road Bridge	SP382638	Wet woodland between Longhole Bridge and Welsh Road	CFA17	Within land required
Sutton Spinney	South-east of the Offchurch Greenway disused railway, east of Offchurch	SP370658	Woodland	CFA17	10m north
South Cubbington Wood	South of B4453 Rugby Road, east of Cubbington	SP352684	Ancient woodland	CFA17	Within land required
North Cubbington Wood	North of B4453 Rugby Road, east of Cubbington	SP350693	Ancient woodland	CFA17	10m north
Field North of North Cubbington Wood	Between North Cubbington Wood and Weston Wood, west of Weston under Wetherley	SP351696	Pasture, proposed translocation receptor site	CFA17	Within land required
Waverley and Weston Woods	North-west of Weston under Wetherley	SP355703	Ancient woodland	CFA17	Immediately north-east of land required
Hares Parlour	On the east side of B4113 Stoneleigh Road opposite Stoneleigh Abbey	SP328709	Woodland	CFA18	Within land required
Brick Kiln Spinney	On the east side of B4113 Stoneleigh Road opposite Stoneleigh Abbey	SP328707	Woodland	CFA18	70m south
Kings Wood	West of Stoneleigh	SP323730	Woodland	CFA18	Immediately north-east of land required
Crewe Farm Woodland	North-west of B4115 at the corner of Crew Lane west of Stoneleigh Park	SP314720	Woodland between pasture fields and road(s)	CFA18	Within land required
Finham Brook, Kenilworth	On the north-west side of Dalehouse Lane, north-east of Kenilworth	SP309731	Watercourse 100m either side of land required	CFA18	Within land required
Kenilworth to Balsall Common Railway Embankment	Railway between Crackley and Gibbett Hill north of Kenilworth	SP303737	Grassland and scrub 100m either side of land required	CFA18	Within land required
Kenilworth Road Spinney	Gibbet Hill, south of Coventry	SP304743	Woodland	CFA18	50m north-east
Birches Wood West	East of Birches Wood Farm, Crackley Lane, Kenilworth	SP290745	Woodland strip alongside footpath 100m either side of land required	CFA18	Within land required

Survey site name	Location	OS grid reference	Description of proposed survey location ³⁷	CFA	Distance from the land required for construction of the Proposed Scheme ³⁸ (m) and orientation
Big Pools Wood	South-east of Burton Green	SP265755	Woodland	CFA18	Immediately south-west of land required
Manor Drive/South Drive Meadow	Alongside the River Cole at South Drive, Coleshill Manor, west of Coleshill	SP188889	Grassland on the north of a bend in the River Cole, bisected by south Drive	CFA19	Within land required
Jack'o'Watton Wood	East of A445 Litchfield Road at Jack'o'Watton	SP190911	Woodland at the far western end of Coleshill Industrial Estate	CFA19	Within land required
Dunton Wood	North-west of Lea Marston	SP196939	Woodland	CFA20	80m south-east
North Wood	East of The Belfry Golf Course, north of Curdworth	SP190957	Ancient woodland	CFA20	Within land required
Rookery	South of Hints	SK152025	Ancient Woodland	CFA21	Within land required
Snake's Hill	West of Hints	SK153032	Woodland on an escarpment north east of Black-Bourne Brook	CFA21	30m north-east
Fulfen Wood	South-east of Streethay, near Huddlesford	SK146097	Two linear woodland blocks	CFA22	Within land required
Little Lyntus	East of Netherstowe Lane and south of Wood End Lane, Curdborough	SK136127	Woodland	CFA22	Within land required
Brokendown Wood	North-west of the Trent and Mersey Canal, north-east of Wood End Lock	SK133135	Woodland between arable fields and canal	CFA22	Within land required
Tomhay Wood	South of Wood End Lane, north of Elmhurst	SK115132	Ancient Woodland	CFA22	Adjacent to land required
Vicar's Coppice	North of Wood End Lane, north of Elmhurst	SK110138	Ancient Woodland	CFA22	Within land required
Harvey's Rough	North-west of Shaw Lane, Hanch Hall	SK102144	Small secondary woodland block on north-east side of existing railway	CFA22	Within land required
West of Tuppenhurst Lane (Ashton Hays Meadow)	West of Tuppenhurst Lane, south-east of Handsacre	SK096153	Linear grassland extending from canal in north to existing railway in south	CFA22	Within land required

5.4 Baseline

CFA16 Ladbroke and Southam

Oxford Canal (030-PH2-118001)

Site description and reasons for selection for survey

- 5.4.1 The Oxford Canal at this location follows low-lying agricultural land to the north of the village of Wormleighton in south Warwickshire. It lays within an area of underlying mudstone formations. The site was selected for survey as it is a potential Local Wildlife Site (LWS) in Warwickshire, and includes a habitat of principal importance (eutrophic standing water). The area surveyed included a 1700m section of the canal, within which is a double bend. The canal banks within the section surveyed are open, and vegetated with dense stands of ruderal vegetation and tall wetland species. There are few shrubs, except for a small number of young willow (*Salix* sp.) trees, but there is a small stand of woodland alongside the canal in the east of the survey area. There is a tow path on the northern bank, separated from the adjacent agricultural land by a hedgerow. Two stone bridges cross the canal within the section.

Vegetation communities present

- 5.4.2 The canal bank vegetation is unchecked on the southern bank, where it forms the edge of the field margins. On the northern bank alongside the towpath the bank side vegetation is checked by mowing or trampling on the towpath, and as a consequence forms a narrow strip. The canal banks are natural, but steep and the vegetation within the water is limited to a few stands of emergent species including yellow iris (*Iris pseudacorus*) and reed sweet-grass (*Glyceria maxima*). There are no visible aquatic species floating on the surface and due to the regular use of the canal by narrow boats the water is turbid.
- 5.4.3 The communities are characterised by frequent and abundant meadowsweet (*Filipendula ulmaria*), with patches of great willowherb (*Epilobium hirsutum*) and scattered false oat-grass (*Arrhenatherum elatius*) (Table 7). Bramble (*Rubus fruticosus* agg.) is also often present, and common nettle (*Urtica dioica*) is occasional but not dominant. Other wetland species include yellow iris, wild angelica (*Angelica sylvestris*), hemlock water-dropwort (*Oenanthe crocata*) and water dock (*Rumex hydrolapathum*). A range of grassland species are found mixed in, especially where the community merges with the adjacent towpath and field margins.
- 5.4.4 Samples were taken from the vegetation communities on the canal banks on both sides. The open bank side vegetation consists of varying amounts of a few co-dominant species and a wide variety of associates at lower abundance. The co-dominant communities are M27b *Filipendula ulmaria*-*Angelica sylvestris* mire, *Urtica dioica*-*Vicia cracca* sub-community and OV26d *Epilobium hirsutum* community, *Arrhenatherum elatius*-*Heracleum sphondylium* sub community, which form a complex mosaic (analysis of five quadrat samples taken from this mosaic with MATCH gave the following coefficients of similarity: M27b: 56%; OV26d: 53%). The distribution of each is affected by waterlogging of the ground, and the meadowsweet community is found in wetter areas, with the great willowherb community present in relatively drier areas. These communities occur throughout lowland Britain on the margins of watercourses,

with the M27b sub-community occurring more regularly in the central, south and east of Britain.

Table 7: NVC frequency table for meadowsweet/great willowherb mosaic on banks of Oxford Canal

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Filipendula ulmaria</i>	5	9	8	8	7	V (5-9)
<i>Arrhenatherum elatius</i>	2	2	2	4	3	V (2-4)
<i>Epilobium hirsutum</i>	7	7	4	-	4	IV (4-7)
<i>Rubus fruticosus</i> agg.	2	1	-	1	6	IV (1-6)
<i>Rumex hydrolapathum</i>	4	-	1	1	-	III (1-4)
<i>Potentilla reptans</i>	3	2	-	3	-	III (2-3)
<i>Calystegia sepium</i>	2	-	2	-	2	III (2)
<i>Iris pseudacorus</i>	4	-	8	-	-	II (4-8)
<i>Festuca rubra</i>	4	-	-	6	-	II (4-6)
<i>Vicia cracca</i>	1	-	-	4	-	II (1-4)
<i>Lathyrus pratensis</i>	3	-	-	3	-	II (2-3)
<i>Urtica dioica</i>	-	-	3	2	-	II (2-3)
<i>Angelica sylvestris</i>	-	-	3	1	-	II (1-3)
<i>Carex hirta</i>	-	2	-	2	-	II (2)
<i>Lycopus europaeus</i>	1	1	-	-	-	II (1)
<i>Tussilago farfara</i>	6	-	-	-	-	I (6)
<i>Bromopsis erecta</i>	4	-	-	-	-	I (4)
<i>Cirsium arvense</i>	-	-	-	-	3	I (3)
<i>Lotus corniculatus</i>	3	-	-	-	-	I (3)
<i>Carex otrubae</i>	-	-	-	2	-	I (2)
<i>Holcus lanatus</i>	-	-	-	2	-	I (2)
<i>Medicago lupulina</i>	2	-	-	-	-	I (2)
<i>Mentha aquatica</i>	2	-	-	-	-	I (2)
<i>Oenanthe crocata</i>	-	-	2	-	-	I (2)
<i>Phalaris arundinacea</i>	-	-	-	-	2	I (2)
<i>Ranunculus repens</i>	-	-	-	2	-	I (2)
<i>Stachys palustris</i>	-	-	2	-	-	I (2)
<i>Trifolium pratense</i>	2	-	-	-	-	I (2)
<i>Dactylis glomerata</i>	-	-	-	1	-	I (1)
<i>Galium aparine</i>	-	-	-	-	1	I (1)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Glyceria maxima</i>	-	-	1	-	-	I (1)
<i>Rumex acetosa</i>	1	-	-	-	-	I (1)
<i>Scutellaria galericulata</i>	-	1	-	-	-	I (1)

- 5.4.5 A small stand of crack willow (*Salix fragilis*) trees is present alongside the canal where a field boundary meets the watercourse. The canopy is composed purely of this species and there are scattered hawthorn (*Crataegus monogyna*) and elder (*Sambucus nigra*) shrubs in the understorey (Table 8). The ground flora is dominated by dense bramble growth which a variety of other ruderal and open ground species at low abundance, including common nettle, cleavers (*Galium aparine*), false oat-grass and hogweed (*Heracleum sphondylium*). This community is a young stand of W6b *Alnus glutinosa*-*Urtica dioica* woodland, *Salix fragilis* sub-community (analysis of the community with MATCH gave a 37% coefficient of similarity for W6b), which is a widespread but locally occurring woodland in lowland Britain. The relatively dry conditions have allowed typical scrub species to become frequent or abundant, particularly bramble and hawthorn.

Table 8: NVC frequency table for stand of wet woodland alongside Oxford Canal

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Salix fragilis</i>					10	I (10)
<i>Crataegus monogyna</i>					2	I (2)
<i>Sambucus nigra</i>					1	I (1)
<i>Rubus fruticosus</i> agg.					10	I (10)
<i>Galium aparine</i>					5	I (5)
<i>Urtica dioica</i>					5	I (5)
<i>Arrhenatherum elatius</i>					2	I (2)
<i>Heracleum sphondylium</i>					2	I (2)
<i>Sonchus oleraceus</i>					2	I (2)
<i>Stachys sylvatica</i>					2	I (2)

Field at Withy Tree Farm (030-PH2-122001)

Site description and reasons for selection for survey

- 5.4.6 This site is permanent semi-improved pasture and damp meadow in the north-east of Withy Tree Farm near Ladbroke, Warwickshire. Windmill Lane borders the north side of the site and the area measures approximately 4.9ha. The site was selected for NVC survey primarily as it is a potential LWS in Warwickshire and potentially includes lowland meadow, a habitat of principal importance. The grassland is grazed by cattle and hay is cut annually. There are signs of an ancient ridge and furrow system indicative of permanent pasture in the absence of ploughing.

Vegetation communities present

- 5.4.7 Constant grassland species within the meadow include rough meadow grass (*Poa trivialis*), meadow foxtail (*Alopecurus pratensis*) and red fescue (*Festuca rubra* agg.). Frequent species include meadow buttercup (*Ranunculus acris*), creeping buttercup (*Ranunculus repens*), red clover (*Trifolium pratense*), white clover (*Trifolium repens*), Yorkshire fog (*Holcus lanatus*), perennial ryegrass (*Lolium perenne*) and cock's-foot (*Dactylis glomerata*). Common sorrel (*Rumex acetosa*), meadow vetchling (*Lathyrus pratensis*) and cowslip (*Primula veris*) were locally abundant at the eastern end of the field, and marsh foxtail (*Alopecurus geniculatus*) was present in wetter depressions in the field.
- 5.4.8 The grassland vegetation community (Table 9) is MG6a *Lolium perenne*-*Cynosurus cristatus* grassland, typical sub-community, which is a virtually ubiquitous community of permanent pasture on moist free draining soils in lowland Britain. Analysis of the community with MATCH gave a 61% coefficient of similarity for MG6a.

Table 9: NVC frequency table for meadow grassland at Withy Tree Farm

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Poa trivialis</i>	8	7	7	6	6	V (6-8)
<i>Alopecurus pratensis</i>	4	5	7	6	4	V (4-7)
<i>Festuca rubra</i>	3	3	2	4	3	V (2-4)
<i>Trifolium pratense</i>	2	2	-	4	8	IV (2-8)
<i>Ranunculus repens</i>	4	4	4	-	5	IV (4-5)
<i>Ranunculus acris</i>	2	5	3	3	-	IV (2-5)
<i>Holcus lanatus</i>	-	4	4	4	4	IV (4)
<i>Lolium perenne</i>	-	4	2	3	2	IV (2-4)
<i>Dactylis glomerata</i>	2	-	2	2	3	IV (2-3)
<i>Trifolium repens</i>	3	3	3	2	-	IV (2-3)
<i>Anthoxanthum odoratum</i>	-	-	-	4	3	II (3-4)
<i>Cirsium arvense</i>	4	1	-	-	-	II (1-4)
<i>Lathyrus pratensis</i>	-	3	3	-	-	II (3)
<i>Cynosurus cristatus</i>	-	-	-	2	3	II (2-3)
<i>Lolium multiflorum</i>	-	-	3	2	-	II (2-3)
<i>Primula veris</i>	-	-	-	1	3	II (1-3)
<i>Cerastium fontanum</i>	-	-	-	2	1	II (1-2)
<i>Rumex acetosa</i>	-	1	2	-	-	II (1-2)
<i>Bromus hordeaceus</i>	-	2	-	-	-	I (2)

- 5.4.9 A very small pond measuring under 0.1ha is present to the north of the site, Withy Tree Farm pasture alongside Windmill Lane, the margins of which are heavily poached

by cattle. It is species-rich with 80-100% cover of emergent plants species. There is a tall herbaceous plant community up to 70cm in height and a floating aquatic plant community. Among the constant species are pink water speedwell (*Veronica catenata*), reed sweet grass, sharp-flowered rush (*Juncus acutiflorus*) and watercress (*Nasturtium officinale*), with meadow foxtail and celery leaved buttercup (*Ranunculus sceleratus*) frequent. The floating aquatic plants comprise common water crowfoot (*Ranunculus aquatilis*) and common water starwort (*Callitriche stagnalis*).

- 5.4.10 The emergent vegetation community (Table 10) is S5b *Glyceria maxima* swamp, *Alisma plantago-aquatica*-*Sparganium erectum* sub-community (with a MATCH co-efficient of similarity of 34%). This community is typical of eutrophic water margins and widespread in suitable habitat in central and east lowland Britain.

Table 10: NVC frequency table for pond emergent vegetation community at Withy Tree Farm

Species	Quadrat locations			Constancy (Domin range)
	Q1	Q2	Q3	
<i>Glyceria maxima</i>	10	10	9	III (9-10)
<i>Juncus acutiflorus</i>	4	4	3	III (3-4)
<i>Veronica catenata</i>	3	3	4	III (3-4)
<i>Nasturtium-officinale</i>	3	2	4	III (2-4)
<i>Ranunculus aquatilis</i>	9	7	-	II (7-9)
<i>Callitriche stagnalis</i>	8	7	-	II (7-8)
<i>Alopecurus pratensis</i>	4	5	-	II (4-5)
<i>Ranunculus sceleratus</i>	4	3	-	II (3-4)
<i>Poa trivialis</i>	2	3	-	II (2-3)
<i>Rumex</i> sp.	2	2	-	II (2)
<i>Veronica beccabunga</i>	2	-	2	II (2)
<i>Lemna</i> sp.	-	-	10	I (10)
<i>Juncus inflexus</i>	2	-	-	I (2)
<i>Ranunculus repens</i>	-	2	-	I (2)
<i>Alisma plantago-aquatica</i>	-	1	-	I (1)
<i>Taraxacum</i> agg.	1	-	-	I (1)

Windmill Hill Spinney (030-PH2-123002)

Site description and reasons for selection for survey

- 5.4.11 This woodland was selected for NVC survey as it is recognised as a potential LWS and includes Lowland Mixed Deciduous Woodland, a habitat of principal importance. The woodland is not listed as Ancient Woodland on the Natural England inventory but is well established, showing on the Ordnance Survey (OS) County Series map of

Warwickshire from the 1880s³⁹. The site also includes an area of scrub to the west that has remnants of calcareous grassland also a Habitat of Principal Importance.

- 5.4.12 Windmill Hill Spinney is a stand of secondary woodland and scrub on a north-facing slope between 100 and 120m above sea level, situated on a limestone escarpment on the west side of Ladbroke Hill. The surrounding land comprises large arable and pasture fields with dividing hedgerows, where the underlying geology is mudstone. No recent habitat management has been carried out.

Vegetation communities present

- 5.4.13 The survey site included an area of mature woodland with a canopy dominated by ash (*Fraxinus excelsior*), but with occasional mature pedunculate oak (*Quercus robur*). There are very few other species present in the canopy. The shrub layer is scattered and locally dense and has frequent elder and midland hawthorn (*Crataegus laevigata*). Common hawthorn is rare at the site. Blackthorn (*Prunus spinosa*), wild privet (*Ligustrum vulgare*) and hazel (*Corylus avellana*) are also present at low abundance. The ground flora is species-poor and characterised by stands of common nettle sprawling mats of rough meadow-grass, and patches of ground ivy (*Glechoma hederacea*) and hart's-tongue thyme-moss (*Plagiomnium undulatum*). This community (Table 11) is a relatively young and species-poor form of W8a *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Primula vulgaris*-*Glechoma hederacea* sub-community (analysis with MATCH gave a relatively low coefficient of similarity of 36%). The vegetation community reflects a transition from tall scrub to woodland. Despite the continuous cover of tall ash trees in the main canopy, the shrub layer and ground flora remain similar to that of W21 *Crataegus monogyna*-*Hedera helix* scrub (which is present on the periphery of the woodland), but shows affinities to woodland on waterlogged but nutrient-rich soils such as the alder dominated W6 *Alnus glutinosa*-*Urtica dioica* woodland. W8a is a common woodland community of established stands on base-rich soils in the central, south and east of lowland Britain.

Table 11: NVC frequency table for Windmill Hill Spinney

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Fraxinus excelsior</i>	10	10	10	10	9	V (9-10)
<i>Quercus robur</i>	2	1	1	-	1	IV (1-2)
<i>Malus domestica</i>	-	-	-	1	1	II (1)
<i>Prunus domestica</i>	-	-	-	-	1	I (1)
<i>Sambucus nigra</i>	4	5	5	5	5	V (4-5)
<i>Crataegus laevigata</i>	7	2	4	5	4	V (2-7)
<i>Ligustrum vulgare</i>	-	2	1	-	1	III (1-2)
<i>Prunus spinosa</i>	1	2	1	-	-	III (1-2)
<i>Crataegus monogyna</i>	-	-	-	-	4	I (4)

³⁹ Ordnance Survey (1883-1887), County Series map of Warwickshire, 1:2500 scale.

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Corylus avellana</i>	-	-	-	1	-	I (1)
<i>Poa trivialis</i>	10	5	10	8	9	V (5-10)
<i>Plagiomnium undulatum</i>	2	4	5	7	9	V (2-9)
<i>Urtica dioica</i>	2	3	9	8	6	V (2-9)
<i>Galium aparine</i>	3	3	2	3	3	V (2-3)
<i>Glechoma hederacea</i>	-	10	-	7	2	III (2-10)
<i>Rubus fruticosus</i> agg.	1	2	-	-	-	II (1-2)
<i>Rumex sanguineus</i>	-	2	-	-	1	II (1-2)
<i>Arum maculatum</i>	-	1	-	1	-	II (1)
<i>Viola hirta</i>	-	-	-	-	6	I (6)
<i>Moehringia trinervia</i>	-	3	-	-	-	I (3)
<i>Geum urbanum</i>	-	2	-	-	-	I (2)
<i>Cirsium vulgare</i>	-	-	-	-	1	I (1)
<i>Fallopia convolvulus</i>	-	-	1	-	-	I (1)
<i>Prunus spinosa</i> (sucker)	1	-	-	-	-	I (1)
<i>Quercus robur</i> (sapling)	-	1	-	-	-	I (1)
<i>Ranunculus acris</i>	-	-	1	-	-	I (1)

- 5.4.14 On the southern edge of the survey site, at the top of the slope, there is a clear delineation in the vegetation between more mature woodland and adjoining mature scrub. A strip of mature scrub without standard trees is present along the southern edge and is contiguous with the woodland. Although not sampled, this edge community was identified from field observations as W21b *Crataegus monogyna*-*Hedera helix* scrub, *Mercurialis perennis* sub-community due to the dominance of hawthorn with only occasional other shrubs such as wild plum (*Prunus domestica*). The ground flora here is shaded and very sparse. This is a common and widely distributed community of hedgerows, woodland edges and neglected farmland, with this sub-community found in mature stands on base-rich soils.
- 5.4.15 West of the spinney, there is an area of neglected grassland, also on the slope, with numerous mature stands of hawthorn scrub that have grown to exclude much of the grassland. These stands (Table 12) are W21a *Crataegus monogyna*-*Hedera helix* scrub, *Hedera helix*-*Urtica dioica* sub-community (analysis with MATCH gave a coefficient of similarity of 40%) and where the denser stands occur the former grassland has been totally excluded and the ground flora is sparse and shaded with just scattered bramble, common nettle and common feather-moss (*Kindbergia praelonga*).

Table 12: NVC frequency table for scrub community at Windmill Hill Spinney

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Crataegus monogyna</i>					9	I (9)
<i>Rubus fruticosus</i> agg.					5	I (5)
<i>Urtica dioica</i>					5	I (5)
<i>Kindbergia praelonga</i>					4	I (4)
<i>Galium aparine</i>					2	I (2)
<i>Sambucus nigra</i>					2	I (2)
<i>Malus domestica</i>					1	I (1)
<i>Tamus communis</i>					1	I (1)

- 5.4.16 In between the scrub blocks is a neglected grassland community (Table 13), which is MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community (MATCH coefficient of similarity of 52%) characterised by tall, tussocky grasses such as false oat-grass and cock's foot, plus a dense mat of red fescue and a scattering of herbaceous species including lady's bedstraw (*Galium verum*), agrimony (*Agrimonia eupatoria*), common nettle and cleavers. This is a very common community of neglected fields and verges on high nutrient soils.

Table 13: NVC frequency table for neglected grassland community at Windmill Hill Spinney

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Arrhenatherum elatius</i>					10	I (10)
<i>Festuca rubra</i>					7	I (7)
<i>Alopecurus pratensis</i>					4	I (4)
<i>Cirsium arvense</i>					4	I (4)
<i>Agrimonia eupatoria</i>					2	I (2)
<i>Dactylis glomerata</i>					2	I (2)
<i>Galium verum</i>					2	I (2)
<i>Holcus lanatus</i>					2	I (2)
<i>Lathyrus pratensis</i>					2	I (2)
<i>Torilis japonica</i>					2	I (2)
<i>Urtica dioica</i>					2	I (2)
<i>Galium aparine</i>					1	I (1)
<i>Heracleum sphondylium</i>					1	I (1)

Southam Road Verge, Ladbroke (030-PH2-124001)

- 5.4.17 This site was selected for survey as it is identified as a potential LWS in Warwickshire. A walkover survey of this site was undertaken where it is within 100m of the land

required for the construction of the Proposed Scheme. The road verge is bordered by a species-poor hedgerow of hawthorn with occasional blackthorn, English elm (*Ulmus procera*) and pedunculate oak. The ground flora was considered to be of negligible nature conservation. Therefore a full NVC survey was not undertaken at this site.

Field North of Ladbroke (030-PH2-123001)

- 5.4.18 This site was selected for survey as it is identified as a potential LWS in Warwickshire. A walkover survey of this site was undertaken where it is within 100m of the land required for the construction of the Proposed Scheme. The primary habitat was improved grassland with perennial ryegrass, crested dog's-tail (*Cynosurus cristatus*) and meadow foxtail. Few herb species are present except for white clover and creeping buttercup. The site did not contain any habitats of principal importance. Therefore a full NVC survey was not undertaken at this site.

Hall Farm Wood, North of A425 Leamington Road Verge near to Thorpe Bridge, Southam (030-PH2-126001)

Site description and reasons for selection for survey

- 5.4.19 This site includes a strip of woodland and a grass verge and is recognised as a potential LWS in Warwickshire; part of Hall Farm Wood pLWS. The site surveyed is adjacent to the northern road verge of the A425 Leamington Road west of Southam. It is a small broadleaved woodland measuring approximately 0.7ha and is not listed as Ancient Woodland on the Natural England inventory. However, the site includes lowland mixed deciduous woodland which is a Habitat of Principal Importance.

Vegetation communities present

- 5.4.20 The woodland canopy is mixed broadleaved and conifer semi-mature to mature trees, up to 25m in height. Ash and common larch (*Larix decidua*) are the dominant canopy species with frequent pedunculate oak, sycamore (*Acer pseudoplatanus*), field maple (*Acer campestre*) and wych elm (*Ulmus glabra*). The scrub layer is well developed consisting of elder, hawthorn, midland hawthorn and occasional blackcurrant (*Ribes nigra*). Ground flora species are diverse and the constants include false brome (*Brachypodium sylvaticum*), lords-and-ladies (*Arum maculatum*), and common feather-moss, with frequent ivy (*Hedera helix*), herb-Robert (*Geranium robertianum*), black bryony (*Tamus communis*), common dog violet (*Viola riviniana*) and spurge-laurel (*Daphne laureola*). The woodland community (Table 14) is W8d *Fraxinus-excelsior-Acer campestre-Mercurialis perennis* woodland. *Hedera helix* sub-community (with a relatively high MATCH coefficient of similarity of 54%), a common type of unmanaged woodland with a dense canopy on base-rich soils in the British lowlands.
- 5.4.21 The woodland species and structural diversity is reduced towards the eastern end of the woodland where the canopy is dominated by Scots pine (*Pinus sylvestris*) with sycamore, and elder, common nettle and cleavers in the understorey. The site also contains a number of large woodland ponds with no emergent vegetation. Directly adjacent to the ponds the ground flora is more indicative of wetter conditions including creeping jenny (*Lysimachia nummularia*).

Table 14: NVC frequency table for woodland community at Leamington Road Verge

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Fraxinus excelsior</i>	4	5	2	7	7	V (2-7)
<i>Quercus robur</i>	4	7	1	2	-	IV (1-7)
<i>Acer campestre</i>	3	5	-	2	2	IV (2-5)
<i>Larix decidua</i>	-	-	2	7	7	III (2-7)
<i>Ulmus glabra</i>	5	4	-	4	-	III (4-5)
<i>Acer pseudoplatanus</i>	2	4	4	-	-	III (2-4)
<i>Pinus sylvestris</i>	1	2	-	1	-	III (1-2)
<i>Aesculus hippocastanum</i>	-	-	5	-	-	I (5)
<i>Ulmus procera</i>	-	-	-	-	2	I (2)
<i>Crataegus monogyna</i>	4	4	4	7	5	V (1-4)
<i>Crataegus laevigata</i>	4	1	4	-	-	III (1-4)
<i>Ligustrum vulgare</i>	1	1	3	-	-	III (1-3)
<i>Prunus spinosa</i>	-	-	-	6	-	I (6)
<i>Taxus baccata</i>	-	-	5	-	-	I (5)
<i>Sambucus nigra</i>	-	-	-	-	4	I (4)
<i>Arum maculatum</i>	2	1	3	1	1	V (1-3)
<i>Brachypodium sylvaticum</i>	7	4	3	3	1	V (1-2)
<i>Kindbergia praelonga</i>	4	-	4	2	10	IV (2-10)
<i>Stachys sylvatica</i>	3	4	4	6	-	IV (3-6)
<i>Geranium robertianum</i>	3	4	4	3	-	IV (3-4)
<i>Geum urbanum</i>	4	3	3	3	-	IV (3-4)
<i>Tamus communis</i>	3	3	3	2	-	IV (2-3)
<i>Alliaria petiolata</i>	-	1	1	2	2	IV (1-2)
<i>Rumex sanguineus</i>	2	1	1	2	-	IV (1-2)
<i>Hedera helix</i>	8	1-	8	-	-	III (8-10)
<i>Glechoma hederacea</i>	1	2	-	7	-	III (1-7)
<i>Galium aparine</i>	-	3	-	4	7	III (3-7)
<i>Viola riviniana</i>	3	3	4	-	-	III (3-4)
<i>Rubus fruticosus</i> agg.	1	-	2	4	-	III (1-4)
<i>Daphne laureola</i>	2	3	3	-	-	III (2-3)
<i>Urtica dioica</i>	-	-	-	3	8	II (3-8)
<i>Ranunculus auricomus</i>	3	2	-	-	-	II (2-3)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Anthriscus sylvestris</i>	-	-	1	2	-	II (1-2)
<i>Sanicula europaea</i>	-	-	3	-	-	I (3)
<i>Poa trivialis</i>	-	-	-	2	-	I (2)
<i>Poa nemoralis</i>	-	-	1	-	-	I (1)
<i>Ribes nigrum</i>	-	-	1	-	-	I (1)
<i>Salix cinerea</i>	-	-	-	1	-	I (1)
<i>Viola odorata</i>	-	-	-	2	-	I (2)

Long Itchington and Ufton Woods SSSI (030-PH2-127001)

Site description and reasons for selection for survey

- 5.4.22 Long Itchington and Ufton Woods is a Site of Special Scientific Interest (SSSI) and Ancient Woodland. It is also recognised as lowland mixed deciduous woodland, a habitat of principal importance. This large woodland of 79ha is situated on an escarpment to the west of Southam, at Bascote Heath in Warwickshire. The woodland lies within two parishes, and the boundary follows a woodbank and stream running north-west to south-east through the centre of the woodland, hence the two names.
- 5.4.23 The plateau of the wood to the south lies on Triassic, sedimentary limestones and mudstones, giving rise to Denchworth Association soils. These are mainly clay loams, slowly permeable and seasonally waterlogged, typically with a pH of 7.5. The lower slopes of the plateau, dipping to the north, are based on Mercia and Penarth mudstone geology of the Triassic era, forming slowly permeable soils of the Worcester Association. The latter are reddish in colour and clayey, and may be either calcareous or non-calcareous. In the extreme southwest, at the highest point of the limestone plateau, there are also better-drained, calcareous soils skirting the woodland perimeter corresponding to the Evesham 1 Association.
- 5.4.24 Running down the northern escarpment in numerous shallow depressions are flushes of poorly-drained, peaty soils, but adjacent to ditches and along raised woodbanks the drainage is much improved and a wide variety of plant species occur. Broad woodbanks define parts of the southern and northern boundaries of the woodland, and the parish boundary dividing Ufton Wood from Long Itchington Wood.
- 5.4.25 Most of the site appears unmanaged and in many places the canopy is beginning to shade out both the understorey and field layer. There is some evidence of recent coppicing adjacent to the central track, on either side of which are also eight or nine alternating coupes, each about 0.25ha, which 15-20 years ago were cleared and replanted with ash and other broadleaves. These areas were not included in the NVC survey. There is evidence of deer browsing on coppice regrowth in places.

Vegetation communities present

- 5.4.26 The majority of the woodland consists of tall pedunculate oak and ash standards over hazel coppice, with field maple, common hawthorn, Midland hawthorn and holly (*Ilex aquifolium*) mainly in the understory. Both dog's mercury (*Mercurialis perennis*) and

bluebell (*Hyacinthoides non-scripta*) are abundant in the field layer, the distribution of each is determined by the extent of waterlogging of the heavy soils; and both species are replaced by tufted hair-grass (*Deschampsia cespitosa*) and pendulous sedge (*Carex pendula*) in the wetter areas.

- 5.4.27 The grassy rides are narrow and overgrown, but are relatively diverse compared with the rest of the wood. Present in the parallel ditches along tracks and in flushed areas are pendulous sedge, remote sedge (*Carex remota*), lesser pond-sedge (*Carex acutiformis*), glaucous sedge (*Carex flacca*), water avens (*Geum rivale*), enchanter's-nightshade (*Circaea lutetiana*), yellow pimpernel (*Lysimachia nemorum*), wild angelica and soft rush (*Juncus effusus*).
- 5.4.28 The woodland community is principally *W8 Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland community, with three sub-communities recorded. This woodland community is particularly associated with coppice-with-standards management and generally south-east distributed⁴⁰.
- 5.4.29 On the freer-draining lower slopes of the plateau on Worcester Association soils, and on Evesham 1 soils in the south-west of the site, the sub-community (Table 15) is predominantly that of *W8b Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland, *Anemone nemorosa* sub-community (MATCH coefficient of similarity of 42%), with abundant bluebell and with ash prominent in the canopy and understorey. Tufted hair-grass and pendulous sedge are absent here. Along the southern perimeter of the wood, dog's mercury, pignut (*Conopodium majus*) and lesser celandine (*Ranunculus ficaria*) are abundant, and common twayblade (*Listera ovata*), early purple orchid (*Orchis mascula*), wood meadow-grass (*Poa nemoralis*) and goldilocks buttercup (*Ranunculus auricomus*) are occasional. This area here was particularly species-rich, with a well-developed field layer. Also present was a large wild pear (*Pyrus pyraster*) over 15m tall, and some wild apple (*Malus sylvestris*).

Table 15: NVC frequency table for woodland community occurring on the lower slopes of the plateau and in the south-west of Long Itchington and Ufton Woods SSSI

Species	Quadrat locations					Constancy (Domin range)
			Q1	Q2	Q3	
<i>Quercus robur</i>			9	4	8	III (4-9)
<i>Fraxinus excelsior</i>			4	7	5	III (4-7)
<i>Acer campestre</i>			-	5	4	II (4-5)
<i>Malus sylvestris</i>			-	4	-	I (4)
<i>Pyrus pyraster</i>			-	1	-	I (1)
<i>Corylus avellana</i>			7	8	8	III (7-8)
<i>Crataegus monogyna</i>			4	5	4	III (4-5)
<i>Fraxinus excelsior</i>			5	3	4	III (3-5)
<i>Lonicera periclymenum</i>			1	2	2	III (1-2)

⁴⁰ Hall, J E, Kirby, K J & Whitbread, A M (2001), *National Vegetation Classification: Field guide to woodland*. Joint Nature Conservation Committee, Peterborough.

Species	Quadrat locations					Constancy (Domin range)
			Q1	Q2	Q3	
<i>Ilex aquifolium</i>			4	5	-	II (4-5)
<i>Crataegus laevigata</i>			5	-	2	II (2-5)
<i>Acer campestre</i>			4	-	-	I (4)
<i>Euonymus europaeus</i>			-	-	2	I (2)
<i>Hedera helix</i>			2	-	-	I (2)
<i>Hyacinthoides non-scripta</i>			10	9	9	III (9-10)
<i>Ranunculus ficaria</i>			2	5	5	III (2-5)
<i>Fraxinus excelsior</i> (seedling)			1	2	2	III (1-2)
<i>Mercurialis perennis</i>			-	9	4	II (4-9)
<i>Conopodium majus</i>			-	5	3	II (3-5)
<i>Anemone nemorosa</i>			-	2	4	II (2-4)
<i>Acer campestre</i> (seedling)			-	2	1	II (1-2)
<i>Corylus avellana</i> (seedling)			-	1	1	II (1)
<i>Stellaria holostea</i>			4	-	-	I (4)
<i>Poa trivialis</i>			-	3	-	I (3)
<i>Galium aparine</i>			2	-	-	I (2)
<i>Carex sylvatica</i>			-	-	1	I (1)
<i>Primula vulgaris</i>			1	-	-	I (1)

5.4.30 W8a *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Primula vulgaris*-*Glechoma hederacea* sub-community is less common than W8b, occurring on the plateau and the escarpment slope. This sub-community (Table 16) has a low abundance of bluebell; and although characterised by the presence of primrose (*Primula vulgaris*), ground-ivy is rarely present. Field maple is constant in this community and small-leaved lime (*Tilia cordata*) coppice is also present in one location, including a large standard tree of the same species, and wild service-tree (*Sorbus torminalis*) in the understorey. Analysis of this community with MATCH gave a relatively low coefficient of similarity of 43%.

Table 16: NVC frequency table for woodland community occurring on the plateau and the escarpment slope at Long Itchington and Ufton Woods SSSI

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	9	8	8	7	6	V (6-9)
<i>Fraxinus excelsior</i>	-	4	5	5	4	V (4-5)
<i>Betula pendula</i>	-	-	-	4	5	II (4-5)
<i>Tilia cordata</i>	-	-	-	-	5	I (5)
<i>Hedera helix</i>	-	-	-	-	1	I (1)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Corylus avellana</i>	7	8	8	8	7	V (7-8)
<i>Crataegus monogyna</i>	4	4	3	4	4	V (3-4)
<i>Crataegus laevigata</i>	5	5	4	-	7	IV (4-7)
<i>Acer campestre</i>	2	4	4	2	-	IV (2-4)
<i>Lonicera periclymenum</i>	1	-	4	2	4	IV (1-4)
<i>Fraxinus excelsior</i>	4	-	4	-	4	III (4)
<i>Ilex aquifolium</i>	1	2	1	-	-	III (1-2)
<i>Sorbus torminalis</i>	-	-	4	-	1	II (1-4)
<i>Hedera helix</i>	2	3	-	-	-	II (2-3)
<i>Cornus sanguinea</i>	-	-	1	1	-	II (1)
<i>Malus sylvestris</i>	-	-	1	1	-	II (1)
<i>Tilia cordata</i>	-	-	-	-	5	I (5)
<i>Salix caprea</i>	-	-	-	1	-	I (1)
<i>Hyacinthoides non-scripta</i>	9	2	5	4	5	V (2-9)
<i>Fraxinus excelsior</i> (seedling)	2	2	-	3	3	IV (2-3)
<i>Carex sylvatica</i>	-	3	2	1	-	III (1-3)
<i>Carex pendula</i>	-	-	4	5	-	II (4-5)
<i>Ranunculus ficaria</i>	1	-	-	3	-	II (1-3)
<i>Deschampsia cespitosa</i>	-	-	3	3	-	II (3)
<i>Anemone nemorosa</i>	-	-	2	2	-	II (2)
<i>Primula vulgaris</i>	2	2	-	-	-	II (2)
<i>Poa trivialis</i>	5	-	-	-	-	I (5)
<i>Stellaria holostea</i>	5	-	-	-	-	I (5)
<i>Ligustrum vulgare</i>	-	-	4	-	-	I (4)
<i>Mercurialis perennis</i>	4	-	-	-	-	I (4)
<i>Brachypodium sylvaticum</i>	-	-	3	-	-	I (3)
<i>Lonicera periclymenum</i>	-	-	-	-	2	I (2)
<i>Arum maculatum</i>	-	-	-	1	-	I (1)
<i>Carex flacca</i>	-	-	1	-	-	I (1)
<i>Crataegus</i> sp. (seedling)	-	-	-	1	-	I (1)
<i>Galium aparine</i>	1	-	-	-	-	I (1)

5.4.31 W8c *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Deschampsia cespitosa* sub-community is comparatively sparse in the field layer and relatively species-poor. This sub-community (Table 17) is typical of the rather wet and

waterlogged areas of the plateau, and in flushes elsewhere. Sedges were also prominent in this sub-community, including pendulous sedge and glaucous sedge. Analysis with MATCH gave a relatively low coefficient of similarity of 40%.

Table 17: NVC frequency table for woodland community occurring in waterlogged areas and flushes at Long Itchington and Ufton Woods SSSI

Species	Quadrat locations					Constancy (Domin range)
		Q1	Q2	Q3	Q4	
<i>Quercus robur</i>		8	7	7	8	IV (7-8)
<i>Fraxinus excelsior</i>		4	5	5	4	IV (4-5)
<i>Betula pendula</i>		4	4	4	-	III (4)
<i>Hedera helix</i>		-	1	-	-	I (1)
<i>Corylus avellana</i>		8	8	8	9	IV (8-9)
<i>Crataegus monogyna</i>		2	5	4	4	IV (2-5)
<i>Lonicera periclymenum</i>		1	3	3	2	IV (1-3)
<i>Prunus spinosa</i>		2	-	3	2	III (2-3)
<i>Ilex aquifolium</i>		-	1	2	1	III (1-2)
<i>Crataegus laevigata</i>		4	4	-	-	II (4)
<i>Acer campestre</i>		2	4	-	-	II (2-4)
<i>Fraxinus excelsior</i>		5	-	-	-	I (5)
<i>Cornus sanguinea</i>		-	-	1	1	II (1)
<i>Carex pendula</i>		4	1	5	8	IV (1-8)
<i>Deschampsia cespitosa</i>		5	5	5	4	IV (4-5)
<i>Fraxinus excelsior</i> (seedling)		3	2	3	3	IV (2-3)
<i>Carex sylvatica</i>		5	4	4	-	III (4-5)
<i>Anemone nemorosa</i>		-	3	2	3	III (2-3)
<i>Ranunculus ficaria</i>		-	3	-	4	II (3-4)
<i>Carex flacca</i>		3	1	-	-	II (1-3)
<i>Brachypodium sylvaticum</i>		2	-	2	-	II (2)
<i>Arum maculatum</i>		-	-	1	1	II (1)
<i>Rubus fruticosus</i> agg.		-	-	1	1	II (1)
<i>Angelica sylvestris</i>		-	-	-	2	I (2)
<i>Ligustrum vulgare</i>		2	-	-	-	I (2)
<i>Lonicera periclymenum</i>		-	1	-	2	I (2)
<i>Stellaria holostea</i>		-	-	2	-	I (2)
<i>Ajuga reptans</i>		-	-	1	-	I (1)
<i>Crataegus</i> sp. (seedling)		-	1	-	-	I (1)
<i>Hyacinthoides non-scripta</i>		-	1	-	-	I (1)

- 5.4.32 These woodland communities are typical of established woodland on base-rich soils in the central, south and east of the British lowlands. W8a is a widespread sub-community, whereas W8b and W8c are commoner on the heavy soils in south-east Britain, and more local in the north-west. These latter sub-communities are less common in Warwickshire and the occurrence of all three together is likely to be confined only to larger ancient woodlands within the county.

CFA17 Offchurch and Cubbington

Grand Union Canal (030-PH2-129001)

Site description and reasons for selection for survey

- 5.4.33 The Grand Union Canal is eutrophic standing open water that is a habitat of principal importance. A section of the Grand Union Canal was surveyed north of the village of Ufton between Welsh Road Bridge to the east and a canal lock to the west. This stretch of canal is supported by wooden revetments, with the banks of the mooring areas close to the lock strengthened with bricks and concrete. The towpath is mown up to the canal edge and separated from neighbouring arable land by a high hedgerow. The southern bank is also supported by wooden revetments and adjacent to dense mature scrub and woodland.

Vegetation communities present

- 5.4.34 The northern bank of the canal is very sparsely vegetated due to the reinforced edges and the mowing and trampling of the towpath. Only a few scattered and low-growing ruderals or wetland species are present such as common nettle, and gypsywort (*Lycopus europaeus*). At one location there is a stand of common club-rush (*Schoenoplectus lacustris*) emerging from the shallow water alongside the northern bank. This stand is approximately 20m long by 1m wide and in association are smaller patches of reed canary-grass (*Phalaris arundinacea*), occasional water mint (*Mentha aquatica*), flowering rush (*Butomus umbellatus*), arrowhead (*Sagittaria sagittifolia*) and orange balsam (*Impatiens canadensis*). This community (Table 18) is S8b *Schoenoplectus lacustris* swamp, *Sparganium erectum* sub-community (analysis with MATCH gave a coefficient of similarity of 44%), which occurs in small stands locally in the Midlands and southern Britain.

Table 18: NVC frequency table for common club-rush-dominated aquatic vegetation community in Grand Union Canal

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Schoenoplectus lacustris</i>					10	I (10)
<i>Phalaris arundinacea</i>					4	I (4)
<i>Impatiens capensis</i>					2	I (2)
<i>Mentha aquatica</i>					2	I (2)
<i>Butomus umbellatus</i>					1	I (1)
<i>Sagittaria sagittifolia</i>					1	I (1)
<i>Sparganium erectum</i>					1	I (1)

- 5.4.35 Close to the northern bank of the canal, near to Longhole Bridge, is a pure stand of arrowhead (Table 19) forming the S16 *Sagittaria sagittifolia* swamp community (analysis with MATCH gave a high coefficient of similarity of 65%). There are no other species associated with this stand. This community occurs in scattered locations in central and southern lowland Britain, but is possibly declining due to susceptibility to pollution⁴¹.

Table 19: NVC frequency table for arrowhead-dominated aquatic vegetation community in Grand Union Canal

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Sagittaria sagittifolia</i>					10	I (10)

- 5.4.36 Very few aquatic plants were recorded within the canal. One or two plants of fennel pondweed (*Potamogeton pectinatus*) were found, suggesting that the aquatic A12 *Potamogeton pectinatus* community is present, which is widely distributed in open waters in lowland Britain, and become more common due to pollution⁴¹. Although the disturbance caused by boats may prevent extensive growth of aquatic plants, the water was too turbid to see submerged plants clearly.

Offchurch Greenway (030-PH2-131001)

Site description and reasons for selection for survey

- 5.4.37 This site is a disused railway, formerly the Leamington to Rugby railway line that includes the Offchurch Greenway and the adjacent Sutton Spinney, and is part of the Radford Railway potential LWS proposed by Warwick District Council. The woodland is not listed as ancient woodland on the Natural England inventory.

- 5.4.38 Offchurch Greenway is now a surfaced public footpath and cycleway. Secondary woodland has developed on the steep cuttings of the former railway track. There are non-native species garden escapes, naturalised within the vegetation community where the embankment backs onto residential buildings. There are two dried out ponds either side of the path adjacent to Sutton Spinney causing localised damper conditions.

Vegetation communities present

- 5.4.39 The woodland is dominated by mature ash with a dense scrub layer dominated by hawthorn. This community has developed on the well drained soils and railway ballast of the former railway line and cutting slopes. The ground flora is species-poor and is concentrated at the bottom of the cuttings, where the habitat structure is more open.
- 5.4.40 The canopy is dominated by mature and semi-mature trees of ash and pedunculate oak measuring up to 20m in height, 1m DBH (trunk diameter at breast height), and spacing of 10-20m apart. The canopy also contains occasional grey willow (*Salix cinerea*), English elm and sycamore. The scrub layer is dominated by hawthorn and elder up to 5m in height and dog rose (*Rosa canina*), blackthorn and bramble occur frequently. The ground flora is dominated by common nettle with varying abundance of other herbaceous species including herb-Robert, hedge woundwort (*Stachys*

⁴¹ Rodwell, J.S. ed. (1995), *British Plant Communities Volume 4: Aquatic Communities, Swamps and Tall-herb Fens*. Cambridge University Press.

sylvatica), wood avens (*Geum urbanum*), wood forget-me-not (*Myosotis sylvatica*) and false brome. Localised water logging adjacent to the seasonally wet ponds near Sutton Spinney has caused a change in ground flora to include pendulous sedge, meadowsweet and gypsywort. The common feather-moss is locally abundant on the north facing embankment.

- 5.4.41 The woodland community (Table 20) is a species-poor W8d *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland *Hedera-helix* sub-community (analysis with MATCH gave a low coefficient of similarity of 36%), typical of shaded woodland on base-rich soils and common in central and south-east Britain. Nutrient enrichment at the bottom of the slope and the dense cover of scrub in the middle sections results in a species-poor ground flora community dominated by species that favour high nutrient environments including common nettle.

Table 20: NVC frequency table for secondary woodland at Offchurch Greenway

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Fraxinus excelsior</i>	8	10	-	10	10	IV (8-10)
<i>Quercus robur</i>	5	-	10	-	-	II (5-10)
<i>Salix cinerea</i>	-	-	-	1	-	I (1)
<i>Sambucus nigra</i>	8	8	5	9	-	IV (5-9)
<i>Crataegus monogyna</i>	6	8	6	-	9	IV (6-9)
<i>Rosa canina</i>	-	-	6	1	5	III (1-6)
<i>Bryonia dioica</i>	1	-	-	-	-	I (1)
<i>Rubus fruticosus</i> agg.	4	2	4	4	2	V (2-4)
<i>Urtica dioica</i>	8	7	4	3	8	V (3-8)
<i>Lamium album</i>	4	5	4	3	2	IV (2-4)
<i>Epilobium hirsutum</i>	2	2	2	-	2	IV (2)
<i>Rumex obtusifolia</i>	-	2	3	-	2	III (2-3)
<i>Arctium major</i>	4	-	4	-	1	III (1-4)
<i>Ranunculus repens</i>	-	4	1	-	3	III (1-4)
<i>Geum urbanum</i>	-	3	-	7	-	II (3-7)
<i>Potentilla reptans</i>	-	5	-	6	-	II (5-6)
<i>Stachys sylvatica</i>	-	-	3	6	-	II (3-6)
<i>Myosotis sylvatica</i>	-	-	-	5	4	II (4-5)
<i>Heracleum sphondylium</i>	2	-	1	-	-	II (1-4)
<i>Calystegia sepium</i>	-	5	-	-	5	II (5)
<i>Galium aparine</i>	3	-	-	3	-	II (3)
<i>Geranium robertianum</i>	-	3	3	-	-	II (3)
<i>Brachythecium rutabulum</i>	9	-	-	-	-	I (9)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Glechoma hederacea</i>	-	7	-	-	-	I (7)
<i>Veronica chamaedrys</i>	-	-	-	5	-	I (5)
<i>Scrophularia nodosa</i>	-	-	-	-	3	I (3)
<i>Filipendula ulmaria</i>	-	2	-	-	-	I (2)
<i>Lycopus europaeus</i>	-	2	-	-	-	I (2)
<i>Rumex sanguineus</i>	-	2	-	-	-	I (2)

Ash Beds (030-PH2-132001)

Site description and reasons for selection for survey

- 5.4.42 Ash Beds is a potential LWS in Warwickshire. The site is recognised as lowland mixed deciduous woodland, a Habitat of Principal Importance. It is a strip of secondary woodland to the north of Offchurch, adjacent to farmland and following a tributary of the River Leam. The woodland does not show signs of past or recent management.
- 5.4.43 There are two earth embankments within the wood, one close to the centre and one near to the western end, orientated north-south. The origin of these is not apparent. The woodland is varied in structure and canopy species. Overhead low-voltage electricity cables cross the centre of site where a wayleave is maintained free of canopy trees.

Vegetation communities present

- 5.4.44 In the canopy the most frequent tree is ash, which dominates in much of the wood. Pedunculate oak is only occasionally found. Other trees present include mature wych elm, lime (*Tilia x europaea*) and crack willow, the latter growing alongside the stream.
- 5.4.45 There is a dense shrub layer formed primarily of common hawthorn and elder, with scattered holly and stands of blackthorn. There is one stand of non-native snowberry (*Symphoricarpos alba*). Ash saplings are common and grey willow occasional by the stream.
- 5.4.46 Prominent in the ground flora are carpets of ivy, which also ascends into the trees. Common nettle and bramble are both frequent and locally abundant, and wood avens, false brome, cleavers, bluebell and herb-Robert were all frequent. Within this woodland several Ancient Woodland indicator plants were recorded, such as bluebell, three-nerved sandwort (*Moehringia trinervia*), and redcurrant (*Ribes rubrum*).
- 5.4.47 This woodland community (Table 21) is W8d *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Hedera helix* sub-community (analysis with MATCH gave a relatively high coefficient of similarity of 53%), which is characteristic of young woodland stands with dense canopy and shrub cover, and common in central and south-east Britain. The analysis of the combined data from all quadrats suggested that the community is also similar to W21b *Crataegus monogyna*-*Hedera helix* scrub, *Mercurialis perennis* sub-community (Also with a MATCH coefficient of similarity of 53%). It is apparent from observations that the community is the result of a slow transition from scrub to woodland and does not contain the species that are

associated with more established woodlands. The OS County Series map of Warwickshire from the 1880s⁴² show the site wooded at least as far back as the late nineteenth century, and also indicate the presence of plantation trees. It is possible that the community has developed since clear felling of a plantation, after which it would be expected for scrub species to colonise.

Table 21: NVC frequency table for woodland in the south of Ash Beds

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Fraxinus excelsior</i>	9	10	10	9	8	V (8-10)
<i>Quercus robur</i>	4	-	1	1	2	III (1-4)
<i>Ulmus glabra</i>	-	-	-	2	-	I (2)
<i>Crataegus monogyna</i>	4	7	4	2	6	V (2-7)
<i>Sambucus nigra</i>	2	4	3	4	2	V (2-4)
<i>Fraxinus excelsior</i> (sapling)	2	2	1	-	3	IV (1-3)
<i>Ilex aquifolium</i>	1	4	-	-	4	III (1-4)
<i>Prunus spinosa</i>	1	4	-	-	2	III (1-4)
<i>Ligustrum vulgare</i>	-	-	4	-	4	II (4)
<i>Hedera helix</i>	3	-	-	-	3	II (3)
<i>Ulmus glabra</i>	-	-	-	7	-	I (7)
<i>Symphoricarpos albus</i>	-	-	-	3	-	I (3)
<i>Acer pseudoplatanus</i> (sapling)	-	-	1	-	-	I (1)
<i>Hedera helix</i>	2	9	8	9	10	V (2-10)
<i>Urtica dioica</i>	4	7	8	1	4	V (1-8)
<i>Geum urbanum</i>	2	3	3	1	2	V (1-3)
<i>Rubus fruticosus</i> agg.	10	6	7	-	5	V (5-10)
<i>Brachypodium sylvaticum</i>	2	2	2	-	2	VI (2)
<i>Galium aparine</i>	8	4	6	-	-	III (4-8)
<i>Hyacinthoides non-scripta</i>	3	-	-	5	1	III (1-5)
<i>Geranium robertianum</i>	1	-	2	-	1	III (1-2)
<i>Poa trivialis</i>	-	3	-	8	-	II (3-8)
<i>Moehringia trinervia</i>	-	-	2	1	-	II (1-2)
<i>Dryopteris filix-mas</i>	1	-	-	-	1	II (1)
<i>Rumex sanguineus</i>	1	-	-	1	-	II (1)
<i>Stachys sylvatica</i>	1	-	1	-	-	II (1)

⁴² Ordnance Survey (1883-1887), County Series Map of Warwickshire, 1:2500 scale.

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Anthriscus sylvestris</i>	-	-	-	5	-	I (5)
<i>Alliaria petiolata</i>	-	3	-	-	-	I (3)
<i>Glechoma hederacea</i>	-	-	-	3	-	I (3)
<i>Rosa arvensis</i>	2	-	-	-	-	I (2)
<i>Viola hirta</i>	-	-	-	2	-	I (2)
<i>Ribes rubrum</i>	-	-	-	-	1	I (1)

River Leam (030-PH2-133001)

Site description and reasons for selection for survey

- 5.4.48 The River Leam is a main river in Warwickshire. The survey site selected included the river up to 100m upstream and downstream of the point of crossing of the Proposed Scheme. It is included in the River Leam potential LWS in Warwickshire. Rivers are a habitat of principal importance. The survey site includes a medium flow stretch of river (4m wide) surrounded by arable fields situated south-west of Hunningham and north-east of Royal Leamington Spa.

Vegetation communities present

- 5.4.49 The channel has a developed marginal vegetation community established on a narrow 1m wide strip along the riverbank extending up to 5m wide occasionally. The riverbanks are steep and there are signs of erosion and slumping. Crack willow and immature alder (*Alnus glutinosa*) trees are recorded occasionally on the riverbank but generally the habitat is open and unshaded.
- 5.4.50 The constant species present in this marginal community include reed canary-grass, common nettle, hedge bindweed (*Calystegia sepium*) and common orache (*Atriplex patula*). Marsh woundwort (*Stachys palustris*), water forget-me-not (*Myosotis scorpioides*) and reed sweet-grass were occasional in abundance. Branched bur-reed (*Sparganium erectum*) and the erect stems and submerged strap-like leaves of common club rush were frequently recorded in the deeper water out into the channel. In general total vegetation cover is 85% on the riverbank and up to 50cm in height.
- 5.4.51 The reed canary-grass community (Table 22) is constant in the habitat, which is S28b *Phalaris arundinacea* tall herb fen, *Epilobium hirsutum*-*Urtica dioica* sub-community (analysis with MATCH analysis gave a coefficient of similarity of 46%). This is a widespread and common community in lowland Britain.

Table 22: NVC frequency table tall herb fen community on the bank of the River Leam

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Phalaris arundinacea</i>	10	10	9	10	10	V (9-10)
<i>Calystegia sepium</i>	4	3	3	2	2	V (2-4)
<i>Atriplex patula</i>	2	2	2	3	2	V (2-3)
<i>Urtica dioica</i>	3	3	2	2	2	V (2-3)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Sparganium erectum</i>	4	7	2	-	-	III (2-7)
<i>Schoenoplectus lacustris</i>	4	-	3	-	-	II (3-4)
<i>Stachys palustris</i>	-	3	4	-	-	II (3-4)
<i>Glyceria maxima</i>	-	-	4	-	-	I (4)
<i>Persicaria maculosa</i>	-	-	-	-	4	I (4)
<i>Galium aparine</i>	-	-	-	-	2	I (2)
<i>Myosotis scorpioides</i>	1	-	-	-	-	I (1)

- 5.4.52 The deeper swamp community dominated by common club rush and occasional branched bur-reed is S8b *Schoenoplectus lacustris* swamp, *Sparganium erectum* sub-community, which is a typical swamp of deep water in the lowlands.

South Cubbington Wood LWS (030-PH2-135001/030-PH2-135002)

Site description and reasons for selection for survey

- 5.4.53 South Cubbington Wood is ancient replanted woodland and a LWS in Warwickshire. The underlying geology of South Cubbington Wood is Mercia Mudstones with superficial deposits of till, sand, gravel and clay. Soil pH, based on the vegetation recorded, is generally neutral.
- 5.4.54 Cubbington Wood is divided into two woodlands (north and south) separated by the B4453 Rugby Road. It is situated to the east of the village of Cubbington on the outskirts of Royal Leamington Spa. South Cubbington Wood is south of Rugby Road and surrounded by arable land.
- 5.4.55 NVC survey was carried out within two woodland compartments in the north of South Cubbington Wood that are within 100m of the land required for the construction of the Proposed Scheme.

Vegetation communities present

- 5.4.56 The two woodland compartments in South Cubbington Wood that were subject to NVC survey have a similar woodland community. In the northern compartment (030-PH2-135002) the canopy and shrub layer species were distributed at an even abundance across the entire compartment. Due to this, the abundance of the species in the canopy and shrub layers was estimated for the whole compartment, approximately 1ha in size, instead of a number of quadrats being taken. The canopy has abundant pedunculate oak, with ash frequent. Silver birch (*Betula pendula*), sycamore, aspen (*Populus tremula*) and rowan (*Sorbus aucuparia*) are also present at low abundance.
- 5.4.57 The north-west compartment (030-PH2-135001) is similar but also has a few individual hornbeam (*Carpinus betulus*) trees. Here, three quadrat samples were taken of all layers of vegetation due to a less even spread of species in the canopy and shrub layers. The shrub layer across the compartments surveyed is variable in density, the density increasing in the north east.

- 5.4.58 Five quadrat samples were taken from the ground flora at locations throughout the northern compartment, and three within the north-west compartment. Hazel coppice is abundant throughout, but hazel growth has been affected by the shaded conditions caused by the closed canopy such that the coppice stools are not densely spaced, and it is easy to walk between them. Other shrubs include common hawthorn, field maple, holly, wild apple and blackthorn.
- 5.4.59 The ground flora is dominated by bluebell throughout, which had receded at the time of the survey. Wood millet (*Milium effusum*) is frequent throughout and wood anemone (*Anemone nemorosa*) occasional. Yellow archangel (*Lamium galeobdolon* ssp. *montanum*) is occasional in the northern compartment. Bramble, cleavers, ivy and male fern (*Dryopteris filix-mas*) are also occasionally present. Variegated yellow archangel (*Lamium galeobdolon* ssp. *argenteum*) was recorded within the ground flora in South Cubbington Wood during a Phase 1 survey in May 2012 although this was not noted during the NVC surveys as it is an early growing species. This is a non-native species in Britain and grows in areas of dense shade and in dry conditions.
- 5.4.60 From observation made during the field survey, this woodland community (Table 24) most closely resembles W8b *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Anemone nemorosa* sub community (MATCH coefficient of similarity of 44%), a woodland community more common on heavy base-rich soils in the south-east of Britain and less common in central Britain. The LWS citation records that W8b is the primary NVC community in the south of South Cubbington Wood, although surveys have only been possible in the northern part of the wood. Analysis of the combined data indicated that the community is similar to W8d *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, with *Hedera helix* sub-community (high MATCH coefficient of similarity of 51%), which generally has a more species-poor ground flora, plus is also characteristic of heavily shaded established woodlands and common throughout lowland Britain on base-rich soils; and W10 *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, *Hedera helix* sub-community (MATCH coefficient of similarity of 45%). This latter community is common on base-poor soils throughout lowland Britain and was recorded as present in the north of South Cubbington Wood in the LWS citation.

Table 23: NVC frequency table for woodland compartment in north-west of South Cubbington Wood (030-PH2-135001)

Species	Quadrat locations					Constancy (Domin range)
			Q1	Q2	Q3	
<i>Quercus robur</i>			7	8	9	III (7-9)
<i>Fraxinus excelsior</i>			8	5	5	III (5-8)
<i>Carpinus betulus</i>			1	-	-	I (1)
<i>Corylus avellana</i> (sapling)			7	7	5	III (5-7)
<i>Ulmus procera</i> (sapling)			2	4	4	III (4)
<i>Ilex aquifolium</i> (sapling)			4	2	4	III (2-4)
<i>Lonicera periclymenum</i>			3	3	3	III (3)
<i>Crataegus monogyna</i> (sapling)			3	3	2	III (2-3)
<i>Acer campestre</i> (sapling)			2	1	-	II (1)

Species	Quadrat locations					Constancy (Domin range)
			Q1	Q2	Q3	
<i>Prunus spinosa</i> (sapling)			1	1	-	II (1)
<i>Hyacinthoides non-scripta</i>			8	6	8	III (6-8)
<i>Fraxinus excelsior</i> (seedling)			3	4	3	III (3-4)
<i>Galium aparine</i>			3	3	4	III (3-4)
<i>Milium effusum</i>			2	2	3	III (2-3)
<i>Anemone nemorosa</i>			2	4	-	II (2-4)
<i>Dryopteris filix-mas</i>			4	-	1	II (1-4)
<i>Hedera helix</i>			-	2	2	II (2)
<i>Rubus fruticosus</i> agg.			-	2	1	II (1-2)
<i>Geranium robertianum</i>			-	-	3	I (3)
<i>Rosa arvensis</i>			-	-	3	I (3)
<i>Brachypodium sylvaticum</i>			-	-	2	I (2)
<i>Geum urbanum</i>			-	1	-	I (1)
<i>Ilex aquifolium</i> (seedling)			-	-	1	I (1)
<i>Lonicera periclymenum</i>			-	1	-	I (1)
<i>Poa trivialis</i>			-	1	-	I (1)
<i>Silene dioica</i>			-	1	-	I (1)
<i>Ulmus procera</i> (sapling)			-	1	-	I (1)

Table 24: NVC frequency table for woodland compartment in the north of South Cubbington Wood (030-PH2-135002)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	8	-	-	-	-	V (8)
<i>Fraxinus excelsior</i>	4	-	-	-	-	V (4)
<i>Betula pendula</i>	2	-	-	-	-	V (2)
<i>Acer pseudoplatanus</i>	1	-	-	-	-	V (1)
<i>Populus tremula</i>	1	-	-	-	-	V (1)
<i>Sorbus aucuparia</i>	1	-	-	-	-	V (1)
<i>Corylus avellana</i>	9	-	-	-	-	V (9)
<i>Crataegus monogyna</i>	2	-	-	-	-	V (2)
<i>Acer campestre</i>	1	-	-	-	-	V (1)
<i>Ilex aquifolium</i>	1	-	-	-	-	V (1)
<i>Malus sylvestris</i>	1	-	-	-	-	V (1)
<i>Prunus spinosa</i>	1	-	-	-	-	V (1)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Rosa arvensis</i>	1	-	-	-	-	V (1)
<i>Sambucus nigra</i>	1	-	-	-	-	V (1)
<i>Ulmus procera</i>	1	-	-	-	-	V (1)
<i>Hyacinthoides non-scripta</i>	9	9	8	10	9	V (8-10)
<i>Fraxinus excelsior</i> (seedling)	-	4	8	1	3	IV (1-8)
<i>Milium effusum</i>	2	2	4	-	2	IV (2-4)
<i>Galium aparine</i>	2	-	1	-	2	III (1-2)
<i>Lamium galeobdolon ssp montanum</i>	1	-	-	-	6	II (1-6)
<i>Rubus fruticosus</i> agg.	2	-	4	-	-	II (2-4)
<i>Populus tremula</i> (sucker)	-	3	-	-	-	I (3)
<i>Anemone nemorosa</i>	-	2	-	-	-	I (2)
<i>Circaea lutetiana</i>	-	-	2	-	-	I (2)
<i>Dryopteris dilatata</i>	-	-	1	-	-	I (1)
<i>Holcus mollis</i>	1	-	-	-	-	I (1)
<i>Lonicera periclymenum</i>	-	1	-	-	-	I (1)
<i>Primula vulgaris</i>	-	-	-	-	1	I (1)

Broadoaks Wood, part of South Cubbington Wood LWS (030-PH2-135003)

Site description and reasons for selection for survey

- 5.4.61 This survey site is adjacent to the north-east boundary of South Cubbington Wood and contiguous with it. It is listed as Ancient Replanted Woodland on the Natural England inventory. It forms a habitat link between South Cubbington Wood and the B4453 Rugby Road and is part of the Broadoaks property. The area of woodland surveyed measures approximately 1.7ha.

Vegetation communities present

- 5.4.62 The high canopy is dominated by pedunculate oak and ash, the mean height of both species being 25-30m. The understory is dominated by hazel with frequent elder, bramble and honeysuckle (*Lonicera periclymenum*). Aspen is dominant in patches and there is occasional field maple and silver birch.
- 5.4.63 The woodland has a diverse ground flora up to 1m in height covering 100% of the woodland floor. Bluebell, and wood millet are constant throughout and common nettle, yellow archangel and red campion (*Silene dioica*) are frequent. Wood sorrel (*Oxalis acetosella*) is occasional.
- 5.4.64 This woodland community is a mosaic of W10c *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, *Hedera helix* sub-community (MATCH coefficient of similarity of 47%) and W8d *Fraxinus-excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Hedera helix* sub-community (MATCH coefficient of similarity of 48%).

These sub-communities are common in unmanaged, heavily shaded stands of established woodland in lowland Britain.

Table 25: NVC frequency table for woodland at Broadoaks (030-PH2-135003)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	4	2	6	7	5	V (2-7)
<i>Fraxinus excelsior</i>	6	2	6	2	6	V (2-6)
<i>Betula pendula</i>	-	-	5	-	-	I (5)
<i>Corylus avellana</i>	2	-	-	5	-	II (2-5)
<i>Malus sylvestris</i>	-	-	-	2	-	I (2)
<i>Pinus sylvestris</i>	-	-	-	2	-	I (2)
<i>Corylus avellana</i>	-	10	4	-	-	II (4-10)
<i>Crataegus monogyna</i>	4	-	2	-	-	II (2-4)
<i>Rubus fruticosus</i> agg.	-	5	7	7	-	III (5-7)
<i>Sambucus nigra</i>	4	-	1	-	5	III (1-5)
<i>Populus tremula</i> sucker	7	-	-	-	3	II (3-7)
<i>Lonicera periclymenum</i>	-	-	2	4	-	II (2-4)
<i>Ilex aquifolium</i>	-	-	1	-	-	I (1)
<i>Hyacinthoides non-scripta</i>	4	6	6	7	4	V (4-7)
<i>Milium effusum</i>	4	4	4	2	5	V (2-5)
<i>Galium album</i>	4	6	7	-	9	IV (4-9)
<i>Lamium galeobdolon</i> ssp <i>montanum</i>	6	4	4	-	5	IV (4-6)
<i>Urtica dioica</i>	4	4	4	-	3	IV (3-4)
<i>Silene dioica</i>	4	2	2	-	3	IV (2-4)
<i>Poa trivialis</i>	7	3	-	-	4	III (3-7)
<i>Stellaria media</i>	2	-	2	-	2	III (2)
<i>Geranium robertianum</i>	-	-	-	4	2	II (2-4)
<i>Rumex obtusifolius</i>	3	2	-	-	-	II (2-3)
<i>Rumex sanguineus</i>	3	3	-	-	-	II (2-3)
<i>Veronica hederifolia</i>	-	-	-	-	5	I (5)
<i>Circaea lutetiana</i>	-	-	-	4	-	I (4)
<i>Kindbergia praelongum</i>	4	-	-	-	-	I (4)
<i>Myosotis sylvatica</i>	-	-	-	-	4	I (4)
<i>Stellaria holostea</i>	-	4	-	-	-	I (4)
<i>Arum maculatum</i>	-	-	-	2	-	I (2)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Mnium hornum</i>	2	-	-	-	-	I (2)
<i>Arctium lappa</i>	-	-	-	-	2	I (2)
<i>Veronica chamaedrys</i>	2	-	-	-	-	I (2)
<i>Oxalis acetosella</i>	2	-	-	-	-	I (2)
<i>Alliaria petiolata</i>	-	-	-	-	1	I (1)

CFA18 Stoneleigh, Kenilworth and Burton Green

Stoneleigh Park East (030-PH2-138001)

Site description and reasons for selection for survey

- 5.4.65 This site is within the Stoneleigh Park Estate located to the east of Kenilworth in Warwickshire and is a part of a potential LWS in Warwickshire. There are parcels of secondary woodland, parkland and a pond within the site.
- 5.4.66 The majority of the woodland at the site is deciduous plantation covering approximately 10ha. It is not ancient woodland listed on the Natural England inventory. The plantation consists of densely planted even-aged trees providing a low closed canopy of 15m in height. There is a very limited scrub or ground flora layer, which are limited to the open patches at the edges of the plantation.

Vegetation communities present

- 5.4.67 Pedunculate oak is the most frequently planted tree, with ash, lime, silver birch also frequent. Occasional wild cherry (*Prunus avium*) and beech (*Fagus sylvatica*) were also present. The limited shrub layer consists of occasional hawthorn, elder, dogwood (*Cornus sanguinea*) and bramble. The ground flora includes bluebell, rough meadow grass and red campion.
- 5.4.68 This woodland community (Table 26) is W10 *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, which is widespread and typical of base poor soils in the lowlands of Britain. As this woodland is a relatively young plantation the sub-community is indeterminate. MATCH gave a relatively low coefficient of similarity of 37%.

Table 26: NVC frequency table for plantation at Stoneleigh Park East

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Quercus robur</i>				7	10	II (7-10)
<i>Fraxinus excelsior</i>				7	-	II (3-7)
<i>Tilia x europaea</i>				3	3	II (3)
<i>Betula pendula</i>				2	1	II (1-2)
<i>Acer platanoides</i>				4	-	I (4)
<i>Fagus sylvatica</i>				-	3	I (3)
<i>Prunus padus</i>				-	2	I (2)

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Poa trivialis</i>				5	2	II (2-5)
<i>Hyacinthoides non-scripta</i>				5	1	II (1-5)
<i>Rubus fruticosus</i> agg.				6	-	I (6)
<i>Geum urbanum</i>				3	-	I (3)
<i>Silene dioica</i>				3	-	I (3)
<i>Brachythecium rutabulum</i>				2	-	I (2)
<i>Galium aparine</i>				2	-	I (2)

- 5.4.69 In the west of this site is a large pond surrounded by a thin margin of wet woodland. The wet woodland is also present on an island in the pond. The wet woodland is dominated by crack willow with occasional pedunculate oak. On the drier areas hawthorn, elder and bramble scrub is dominant with common nettle and great willowherb associated. Ground conditions are damp and in the ground flora are bittersweet (*Solanum dulcamara*), common figwort (*Scrophularia nodosa*), soft rush, hard rush (*Juncus inflexus*) and bulrush (*Typha latifolia*). An inlet stream at the western end of the pond has a slow flow and contains watercress. The pond has no aquatic plant communities in the open water.
- 5.4.70 The wet woodland community (Table 27) is closest to W6b *Alnus glutinosa-Urtica dioica* woodland, *Salix fragilis* sub-community, which has a widespread but local distribution within the lowlands of Britain, due to the dominance of crack willow in the canopy and presence of common nettle, although alder is absent (MATCH coefficient for W6 is relatively low at 30%). Drier areas of the woodland more closely resemble W6e *Alnus glutinosa-Urtica dioica* woodland, *Sambucus nigra* sub-community due to the denser scrub layer of hawthorn and elder.

Table 27: NVC frequency table for wet woodland at Stoneleigh Park East

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Salix fragilis</i>				10	9	II (9-10)
<i>Rubus fruticosus</i> agg.				4	9	II (4-9)
<i>Quercus robur</i>				4	4	II (4)
<i>Crataegus monogyna</i>				-	4	I (4)
<i>Sambucus nigra</i>				-	2	I (2)
<i>Salix cinerea</i>				1	-	I (1)
<i>Rumex sanguineus</i>				3	2	II (2-3)
<i>Scrophularia nodosa</i>				4	2	II (2-4)
<i>Solanum dulcamara</i>				4	2	II (2-4)
<i>Urtica dioica</i>				2	4	II (2-4)
<i>Galium aparine</i>				2	2	II (2)

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Rosa canina</i>				-	4	I (4)
<i>Arum maculatum</i>				-	2	I (2)
<i>Epilobium hirsutum</i>				2	-	I (2)
<i>Juncus effusus</i>				2	-	I (2)
<i>Juncus inflexus</i>				2	-	I (2)
<i>Carex acutiformis</i>				1	-	I (1)
<i>Deschampsia cespitosa</i>				1	-	I (1)
<i>Poa trivialis</i>				-	1	I (1)

Stareton Woodlands (within Stoneleigh Park)

Site description and reasons for selection for survey

- 5.4.71 This site is within the Stoneleigh Park and part of a potential LWS in Warwickshire. It includes parkland and scattered trees as well as parcels of woodland. The site is part of the Stoneleigh Estate 'Deer Park', and two woodlands were surveyed, referred to as Stareton Woodland 1 and 2. The park has a number of veteran trees.
- 5.4.72 Stareton Woodland 1 is bounded by the Stareton Road to the south and to the north by a wide pasture adjacent to the River Avon. Matthias Baker's map of 1776 shows this as an open park, fringed by trees with a single clump in the middle. A narrow strip of woodland alongside Stareton Road is also shown on the OS County Series map of Warwickshire from the 1880s⁴³, together with individual park trees dotted around the fringes. In more recent times these park trees and the woodland strip have become merged together to form a much wider woodland of approximately 3.2ha, supplemented by post-war planting and natural regeneration. Sections of an old wrought-iron fence running through the wood suggest that this may have been an original boundary, with woodland on the southern side. Within the site is an area of disturbance which is a former excavation. In the wood at this point are many hummocks and hollows containing building debris.
- 5.4.73 Stareton Woodland 2 is adjacent to and partly enclosed by a shallow meander of the river Avon. It is a small area (0.6ha) of woodland and scrub. This appears to have been open in 1776. Recently it has been planted, while to the east is a small remnant of mature wet woodland.

Stareton Woodland 1 (030-PH2-138007) – vegetation communities

- 5.4.74 This woodland has an even-aged canopy of pedunculate oak, probably planted in the post-war period, with occasional ash, sycamore, wych elm and English elm, above an understorey of holly and elder. There are some ancient specimens of pedunculate oak and Turkey oak (*Quercus cerris*), probably in excess of 200 years old, with broad, spreading canopies indicating their existence as former park trees. Under closed canopy areas the ground flora is very sparse, with ivy, broad buckler-fern (*Dryopteris*

⁴³ Ordnance Survey (1883-1887), County Series Map of Warwickshire, 1:2500 scale.

dilatata) and male fern frequent, and bramble or common nettle frequent in more open and disturbed patches. There were few ancient woodland indicator species present and only very isolated patches of bluebell and dog's mercury. In an area of former quarrying and tipping, the canopy is dominated by sycamore and there is a ground flora of ivy and common nettle, although soft shield-fern (*Polystichum setiferum*) and dog's mercury were also present.

- 5.4.75 The woodland along the roadside is older and there were several indicators of ancient woodland such as bluebell, dog's mercury, wood millet, three-veined sandwort and yellow pimpernel, together with wych elm and holly in the canopy and understorey. A number of exotic species including box (*Buxus sempervirens*), Turkey oak, sweet chestnut (*Castanea sativa*) and rhododendron (*Rhododendron ponticum*) are present, along with other indicators of disturbance in the field layer.
- 5.4.76 This woodland community (Table 28) was identified in the field as W8e *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Hedera helix* sub-community, although lacking many of its components. Analysis of this community with MATCH did not reliably confirm this community, but identification was based on surveyor experience. This woodland community is typical of young or heavily-shaded stands and widespread in the British lowlands on base-rich soils.

Table 28: NVC frequency table for woodland 1 at Stareton

Species	Quadrat locations					Constancy (Domin range)
			Q1	Q2	Q3	
<i>Acer pseudoplatanus</i>			9	8	5	III (5-9)
<i>Quercus robur</i>			6	5	7	III (5-7)
<i>Ilex aquifolium</i>			5	4	4	III (4-5)
<i>Sambucus nigra</i>			4	5	4	III (4-5)
<i>Ulmus glabra</i>			4	4	4	III (4)
<i>Hedera helix</i>			2	2	4	III (2-4)
<i>Crataegus monogyna</i>			3	2	3	III (2-3)
<i>Fraxinus excelsior</i>			1	-	5	II (1-5)
<i>Castanea sativa</i> (planted)			-	4	-	I (4)
<i>Prunus avium</i> (planted)			-	-	4	I (4)
<i>Taxus baccata</i>			4	-	-	I (4)
<i>Ulmus procera</i>			-	-	2	I (2)
<i>Buxus sempervirens</i> (planted)			1	-	-	I (1)
<i>Quercus cerris</i> (planted)			1	-	-	I (1)
<i>Hyacinthoides non-scripta</i>			5	8	1	III (1-8)
<i>Acer pseudoplatanus</i> (seedling)			1	2	2	III (1-2)
<i>Galium aparine</i>			-	8	5	II (5-8)
<i>Rubus fruticosus</i> agg.			8	-	4	II (4-8)

Species	Quadrat locations					Constancy (Domin range)
			Q1	Q2	Q3	
<i>Urtica dioica</i>			-	2	8	II (2-8)
<i>Glechoma hederacea</i>			-	4	5	II (4-5)
<i>Hedera helix</i>			2	-	4	II (2-4)
<i>Silene dioica</i>			-	5	-	I (5)
<i>Galeopsis tetrahit</i>			-	4	-	I (4)
<i>Dryopteris dilatata</i>			-	-	2	I (2)
<i>Dryopteris filix-mas</i>			-	-	2	I (2)
<i>Castanea sativa</i> (seedling)			-	1	-	I (1)
<i>Fraxinus excelsior</i> (seedling)			-	-	1	I (1)
<i>Mercurialis perennis</i>			-	1	-	I (1)
<i>Taxus baccata</i> (seedling)			1	-	-	I (1)

Stareton Woodland 2 (030-PH2-138006) – vegetation communities

- 5.4.77 This wood is partly a wide-spaced, recently planted cricket-bat willow (*Salix alba* var. *caerulea*) plantation, and is heavily influenced by the vegetation in the adjacent field, with cock's foot, false oat-grass, Yorkshire fog and common couch (*Elytrigia repens*) in the understorey. Much of the ground flora is dominated by common nettle or bramble. A high water-table and occasional flooding is reflected in the presence of meadowsweet and wild angelica, with alder scattered along the riverbank with older, probably unplanted individuals of white willow (*Salix alba*). There is a small, intact area of alder in the east of the site, with bearded couch (*Elymus caninus*) and remote sedge.
- 5.4.78 This woodland community (Table 29) shows a transition from W24 *Rubus fruticosus*-*Holcus lanatus* underscrub towards a mature wet woodland community, W7b *Alnus glutinosa*-*Fraxinus excelsior*-*Lysimachia nemorum* woodland, *Carex remota*-*Cirsium palustre* sub-community. W7 is only locally distributed on wet soils in the south and east of Britain, being more common in the north and west.

Table 29: NVC frequency table for woodland 2 at Stareton

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Alnus glutinosa</i>					9	I (9)
<i>Quercus robur</i>					6	I (6)
<i>Crataegus monogyna</i>					4	I (4)
<i>Salix cinerea</i>					4	I (4)
<i>Acer pseudoplatanus</i>					1	I (1)
<i>Ranunculus repens</i>					5	I (5)
<i>Urtica dioica</i>					5	I (5)

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Elymus caninus</i>					4	I (4)
<i>Filipendula ulmaria</i>					4	I (4)
<i>Geum urbanum</i>					4	I (4)
<i>Juncus effusus</i>					4	I (4)
<i>Angelica sylvestris</i>					1	I (1)
<i>Fraxinus excelsior</i> (seedling)					1	I (1)
<i>Rubus fruticosus</i> agg.					1	I (1)
<i>Rumex sanguineus</i>					1	I (1)

Stoneleigh Park

Site description and reasons for selection for survey

- 5.4.79 Stoneleigh Park Estate is a potential LWS in Warwickshire. There are a few individual parcels of secondary woodland, parkland and scattered trees within the area, and a large number of veteran trees. The OS map of Warwickshire from the 1880s⁴⁴ shows a relatively open area, with scattered park trees and lightly wooded fringes. Some of the woodlands at the site are recent plantations. Scattered throughout are some very ancient park trees, with veterans up to 250 years old. Planting of exotics is common and there are also farm woodland demonstration areas of poplar (*Populus* sp.) and willow varieties. There are seven woods located within the site, referred to below as Stoneleigh Park Woodlands 1 to 7.

Stoneleigh Park Woodland 1 (030-PH2-139005) – vegetation communities

- 5.4.80 This is a small farm woodland planting (approximately 0.2 hectares) of mixed broadleaved trees, about 20-25 years old, with original plastic tubes still visible. Some older, probably unplanted willow and alder are present in wet depressions. The site is much disturbed and is currently used for off-road vehicle training, creating multiple tracks and pools throughout. The species present reflect this disturbance and only a few fast-colonising shade species were present. The area surveyed was relatively open and grassy and was identified as W22a *Prunus spinosa*-*Rubus fruticosus* underscrub, *Hedera helix*-*Silene dioica* sub-community, a widespread community in the British lowlands, albeit a poor match.

Stoneleigh Park Woodland 2 (030-PH2-139004) – vegetation communities

- 5.4.81 This comprises a small clump of six mature (>100 year old) pedunculate oak trees, flanked by a young plantation to the north and east, consisting of pedunculate oak, ash, wild cherry, birch and larch (*Larix* sp.). The plantation has a closed canopy and a field layer with wood avens, red campion, common nettle, rough meadow-grass and cock's foot, and occasional male fern. The area under the oaks is very much disturbed, having recently been used as a pig pen. The vegetation community (Table 30) at this site did not show any affinity to any published NVC community.

⁴⁴ Ordnance Survey (1883-1887), County Series Map of Warwickshire, 1:2500 scale.

Table 30: NVC frequency table for Woodland 2 at Stoneleigh Park

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Quercus robur</i>					8	I (8)
<i>Sambucus nigra</i>					2	I (2)
<i>Silene dioica</i>					7	I (7)
<i>Cirsium vulgare</i>					6	I (6)
<i>Urtica dioica</i>					5	I (5)
<i>Rumex obtusifolius</i>					4	I (4)
<i>Sisymbrium officinale</i>					4	I (4)
<i>Tripleurospermum maritimum</i>					4	I (4)
<i>Epilobium montanum</i>					3	I (3)
<i>Geum urbanum</i>					3	I (3)
<i>Plantago lanceolata</i>					2	I (2)
<i>Polygonum aviculare</i>					2	I (2)

Stoneleigh Woodland 3, Gilbert's Spinney (030-PH2-139006) – vegetation communities

- 5.4.82 This 3.7ha woodland beside the River Avon is a complex of plantation, older woodland and ornamental planting. A large section in the north of the woodland includes a poplar plantation (Table 31). Trees are evenly spaced along a gently sloping flood plain, the light canopy allowing a grassy and tall herb field layer to persist, with species such as common nettle, false oat-grass and hogweed dominant. Adjacent to the southernmost block of poplar were additional plantings of wild cherry, coppiced hazel and small-leaved lime; the field layer here is abundant with wood avens and red campion. The river bank itself retains occasional unplanted white willow and alder.

Table 31: NVC frequency table for poplar plantation in Gilbert's Spinney

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Alnus glutinosa</i>					4	I (7)
<i>Populus x canadensis</i> (planted)					10	I (2)
<i>Populus x trichocarpa</i> (planted)					4	I (8)
<i>Crataegus monogyna</i>					4	I (8)

- 5.4.83 In the southern section of the wood, there are mature and veteran pedunculate oak trees, with occasional Turkey oak, other exotic oak specimens, and Scots pine in a high canopy. Beneath the canopy is mixed under-planting of younger trees. The field layer is sparse and heavily shaded in places, and has been much disturbed by rabbit burrowing and dumping of rubbish except near the river, where it reverts to a grassy and tall herb community. A few traces of an ancient woodland flora were found in one

location in the field layer with patches of bluebell, dog's mercury, holly and bearded couch present.

- 5.4.84 This woodland community (Table 32) is not typical of established woodland vegetation and as such is a poor fit to both woodland and scrub communities of the NVC. It was identified as being between W24a *Rubus fruticosus*-*Holcus lanatus* underscrub and W8 *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, common on base-rich soils throughout lowland Britain.

Table 32: NVC frequency table for semi-natural woodland in Gilbert's Spinney

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Populus x trichocarpa</i> (planted)				5	5	II (5)
<i>Quercus robur</i>				5	5	II (5)
<i>Fraxinus excelsior</i>				4	5	II (4-5)
<i>Acer platanooides</i> (planted)				4	4	II (4)
<i>Crataegus monogyna</i>				4	2	II (2-4)
<i>Prunus avium</i> (planted)				4	4	II (4)
<i>Salix alba</i>				4	4	II (4)
<i>Sambucus nigra</i>				2	3	II (2-3)
<i>Malus sylvestris</i> (planted)				1	1	II (1)
<i>Aesculus hippocastanum</i> (planted)				-	5	I (5)
<i>Pinus sylvestris</i> (planted)				5	-	I (5)
<i>Quercus</i> sp. (planted)				5	-	I (5)
<i>Chamaecyparis</i> sp. (planted)				-	4	I (4)
<i>Corylus avellana</i>				-	4	I (4)
<i>Ilex aquifolium</i>				-	4	I (4)
<i>Picea abies</i> (planted)				4	-	I (4)
<i>Quercus cerris</i> (planted)				-	4	I (4)
<i>Acer pseudoplatanus</i>				-	2	I (2)
<i>Ulmus procera</i>				-	2	I (2)
<i>Acer campestre</i>				-	1	I (1)
<i>Euonymus europaeus</i>				-	1	I (1)
<i>Fagus sylvatica</i> (planted)				-	1	I (1)
<i>Prunus spinosa</i>				-	1	I (1)
<i>Salix caprea</i>				1	-	I (1)
<i>Sorbus aucuparia</i> (planted)				1	-	I (1)
<i>Sorbus intermedia</i> (planted)				-	1	I (1)

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Hyacinthoides non-scripta</i>				8	5	II (5-8)
<i>Silene dioica</i>				5	5	II (5)
<i>Cirsium arvense</i>				4	4	II (4)
<i>Geum urbanum</i>				4	4	II (4)
<i>Rubus fruticosus</i> agg.				4	4	II (4)
<i>Acer campestre</i> (seedling)				4	-	I (4)
<i>Fraxinus excelsior</i> (seedling)				4	-	I (4)
<i>Galium aparine</i>				-	4	I (4)
<i>Mercurialis perennis</i>				4	-	I (4)
<i>Holcus lanatus</i>				3	-	I (3)
<i>Poa trivialis</i>				-	3	I (3)
<i>Dryopteris dilatata</i>				-	2	I (2)
<i>Rumex sanguineus</i>				-	1	I (1)

Stoneleigh Park Woodland 4 (030-PH2-139001) – vegetation communities

- 5.4.85 Stoneleigh Woodland 4 is a recent cricket bat willow plantation of approximately 1.5ha in size, lying adjacent to the River Avon. There is a developing natural scrub layer of alder, hybrid poplar (*Populus x canadensis*), elder, hawthorn, pedunculate oak, goat willow (*Salix caprea*), and grey willow, with a tall herb layer beneath, dominated by Indian balsam (*Impatiens glandulifera*) and common nettle. Notable amongst the herb layer was small teasel (*Dipsacus pilosus*), but no ancient woodland indicator species were evident.

Stoneleigh Park Woodland 5 (030-PH2-140001) – vegetation communities

- 5.4.86 This 0.7ha strip of woodland runs along the B4115, bounded at the roadside by a hawthorn hedge and by an old sunken lane to the south. The canopy consists of ancient, tall pedunculate oak with ash, birch, beech and wych elm, together with planted copper beech and grey poplar (*Populus x canescens*). Much of the understorey is overrun by rhododendron and bracken (*Pteridium aquilinum*). In the less disturbed western section, there were several ancient woodland indicator species, including holly, wood millet, bluebell, yellow pimpernel, remote sedge and three-nerved sandwort. This woodland community (Table 33) is intermediate between W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland and W8a *Fraxinus excelsior-Acer campestre-Mercurialis-perennis* woodland, widespread woodland communities of the lowlands in the south and east of Britain.

Table 33: NVC frequency table for Woodland 5 at Stoneleigh Park

Species	Quadrat locations					Constancy (Domin range)
		Q1	Q2	Q3	Q4	
<i>Quercus robur</i>		8	8	8	9	IV (8-9)
<i>Fraxinus excelsior</i>		7	7	5	-	III (5-7)
<i>Rhododendron ponticum</i>		5	5	5	7	IV (5-7)
<i>Fagus sylvatica</i>		-	-	2	4	II (2-4)
<i>Sambucus nigra</i>		4	4	4	4	IV (2-4)
<i>Betula pendula</i>		-	-	2	4	II (2-4)
<i>Taxus baccata</i>		5	5	5	4	IV (4-5)
<i>Acer campestre</i>		-	-	4	-	I (4)
<i>Lonicera periclymenum</i>		4	4	-	-	II (4)
<i>Malus sylvestris</i>		-	-	-	1	I (1)
<i>Crataegus monogyna</i>		4	4	4	5	IV (4-5)
<i>Populus x canescens</i> (planted)		5	5	-	4	III (4-5)
<i>Corylus avellana</i>		4	4	-	-	II (4)
<i>Hedera helix</i>		3	3	3	-	III (3)
<i>Buxus sempervirens</i> (planted)		-	-	-	4	I (4)
<i>Ilex aquifolium</i>		5	5	-	2	III (2-5)
<i>Ulmus glabra</i>		4	4	1	2	IV (1-4)
<i>Fraxinus excelsior</i> (seedling)		3	2	1	-	III (1-3)
<i>Agrostis capillaris</i>		-	-	3	1	II (1-3)
<i>Galium aparine</i>		-	4	-	-	I (4)
<i>Pteridium aquilinum</i>		-	-	-	5	I (5)
<i>Rubus fruticosus</i> agg.		4	4	7	4	IV (4-7)
<i>Poa trivialis</i>		2	-	-	-	I (2)
<i>Quercus robur</i> (seedling)		1	-	-	-	I (1)
<i>Silene dioica</i>		-	3	6	5	III (3-6)
<i>Geum urbanum</i>		1	-	-	-	I (1)
<i>Moehringia trinervia</i>		-	-	1	-	I (1)
<i>Milium effusum</i>		7	2	-	2	III (2-7)
<i>Dryopteris dilatata</i>		-	-	1	-	I (1)
<i>Hyacinthoides non-scripta</i>		7	4	4	8	IV (4-8)
<i>Taxus baccata</i> (seedling)		-	-	-	1	I (1)
<i>Lysimachia nemorum</i>		-	-	1	-	I (1)

Species	Quadrat locations					Constancy (Domin range)
		Q1	Q2	Q3	Q4	
<i>Holcus lanatus</i>		-	-	3	-	I (3)
<i>Geranium robertianum</i>		-	4	-	-	I (4)
<i>Hedera helix</i>		2	1	-	-	II (1-2)
<i>Digitalis purpurea</i>		-	*	6	2	II (2-6)
<i>Epilobium montanum</i>		-	1	-	-	I (1)
<i>Ilex aquifolium</i> (seedling)		1	-	-	-	I (1)
<i>Mercurialis perennis</i>		-	3	-	-	I (3)
<i>Galeopsis tetrahit</i>		-	-	-	2	I (2)
<i>Glechoma hederacea</i>		-	5	-	4	II (4-5)
<i>Crataegus monogyna</i> (seedling)		1	-	2	2	III (1-2)

Stoneleigh Park Woodland 6 (030-PH2-140002) – vegetation communities

- 5.4.87 Further along the B4115 to the west of Woodland 5, this is a small section of wood that occupies an area of about 100m by 25m. The canopy consists of several ancient individuals of beech with pedunculate oak planted underneath. There are elements of an ancient woodland flora, including abundant bluebell, with wood millet, creeping soft-grass (*Holcus mollis*) and holly also present. This woodland community (Table 34) is also intermediate between *W10 Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland and *W8a Fraxinus excelsior-Acer campestre-Mercurialis-perennis* woodland, widespread woodland communities of the lowlands in the south and east of Britain.

Table 34: NVC frequency table Woodland 6 at Stoneleigh Park

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Betula pendula</i>					7	I (7)
<i>Quercus robur</i>					5	I (5)
<i>Fagus sylvatica</i>					5	I (5)
<i>Fraxinus excelsior</i>					4	I (4)
<i>Quercus cerris</i> (planted)					1	I (1)
<i>Sambucus nigra</i>					3	I (3)
<i>Sorbus aria</i> (planted)					4	I (4)
<i>Carpinus betulus</i> (planted)					1	I (1)
<i>Malus sylvestris</i> (planted)					4	I (4)
<i>Crataegus monogyna</i>					5	I (5)
<i>Taxus baccata</i>					5	I (5)
<i>Tilia x europaea</i> (planted)					5	I (5)
<i>Acer pseudoplatanus</i>					4	I (4)

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Ilex aquifolium</i>					4	I (4)
<i>Buxus sempervirens</i> (planted)					3	I (3)
<i>Hedera helix</i>					2	I (2)
<i>Ulmus procera</i>					4	I (4)
<i>Fraxinus excelsior</i> (seedling)					4	I (4)
<i>Hedera helix</i>					2	I (2)
<i>Milium effusum</i>					2	I (2)
<i>Rubus fruticosus</i> agg.					7	I (7)
<i>Urtica dioica</i>					2	I (2)
<i>Poa trivialis</i>					2	I (2)
<i>Silene dioica</i>					3	I (3)
<i>Geum urbanum</i>					1	I (1)
<i>Carpinus betulus</i> (seedling)					1	I (1)
<i>Hyacinthoides non-scripta</i>					7	I (7)
<i>Rumex sanguineus</i>					2	I (2)
<i>Holcus lanatus</i>					5	I (5)
<i>Sambucus nigra</i> (seedling)					2	I (2)
<i>Acer pseudoplatanus</i> (seedling)					2	I (2)
<i>Holcus mollis</i>					4	I (4)
<i>Crataegus monogyna</i> (seedling)					1	I (1)

Stoneleigh Park Woodland 7 (030-PH2-139003)

- 5.4.88 This woodland is formed on a steep bank above the River Avon and contains a few veteran oaks around the perimeter, but is mainly comprised of a plantation of Scots pine, with some pedunculate oak and Turkey oak. Underneath there is a developing scrub layer of hawthorn, elder, hazel and holly. Close to the river there is planted cricket bat willow, plus a few unplanted trees of crack willow and alder. The field layer is dominated by Indian balsam, with common nettle dominant along the river side. The woodland community grades from W8 *Fraxinus excelsior*-*Acer campestre*-*Mercurialis-perennis* woodland on the slope to W6b *Alnus glutinosa*-*Urtica dioica* woodland, *Salix fragilis* sub-community, typical of wet soils and locally distributed throughout the British lowlands, on the river terrace.

River Avon (030-PH2-139002)

Site description and reasons for selection for survey

- 5.4.89 The River Avon is a major river that flows through Stoneleigh Park where the Proposed Scheme crosses. The stretch of the river at this location is not a LWS but is a

habitat of principal importance. The river at this location is approximately 20m wide and up to 3m deep at the edges with a slow to medium flow.

Vegetation communities present

- 5.4.90 The banks are covered in a tall herb community dominated by common nettle, with frequent cleavers, common couch and creeping thistle (*Cirsium arvensis*). Occasional semi-mature crack willow and alder are scattered on the riverbank, but the canopy cover is less than 30%. The tall herb community on the riverbank (Table 35) is OV24a *Urtica dioica*-*Galium aparine* community, typical sub-community (with a high MATCH coefficient of similarity of 52%), which is a common and widespread community of high-nutrient soils throughout Britain.

Table 35: NVC frequency table for tall herb community on bank of River Avon

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Urtica dioica</i>	10	10	10	10	10	V (10)
<i>Elytrigia repens</i>	3	4	3	-	-	III (3-4)
<i>Galium aparine</i>	2	2	4	-	-	III (2-4)
<i>Cirsium arvense</i>	2	3	2	-	-	III (2-3)
<i>Salix fragilis</i>	4	-	-	-	7	II (4-7)
<i>Impatiens glandulifera</i>	-	3	5	-	-	II (3-5)
<i>Alnus glutinosa</i>	-	5	4	-	-	II (4-5)
<i>Rubus fruticosus</i> agg.	4	4	-	-	-	II (4)
<i>Heracleum sphondylium</i>	1	-	2	-	-	II (1-2)
<i>Crataegus monogyna</i>	-	-	-	-	4	I (4)
<i>Anthriscus sylvestris</i>	-	-	2	-	-	I (2)
<i>Conium maculatum</i>	2	-	-	-	-	I (2)
<i>Epilobium hirsutum</i>	-	-	2	-	-	I (2)
<i>Holcus lanatus</i>	-	-	2	-	-	I (2)
<i>Silene dioica</i>	2	-	-	-	-	I (2)
<i>Lamium album</i>	-	-	1	-	-	I (1)
<i>Populus x canadensis</i>	1	-	-	-	-	I (1)
<i>Quercus robur</i>	-	1	-	-	-	I (1)
<i>Sambucus nigra</i>	1	-	-	-	-	I (1)

- 5.4.91 Submerged and floating aquatic plant communities are present in a few small patches in the channel including the strap-like submerged leaves of common club rush, the submerged leaves of yellow water-lily (*Nuphar lutea*) and the floating leaves of white water lily (*Nymphaea alba*). The co-dominance of the water-lily species indicates the presence of the aquatic community N8 *Nuphar lutea* community, *Nymphaea alba* sub-community, locally distributed in ponds, lakes and slow-moving rivers within Britain.

- 5.4.92 There is an area of swamp covering approximately 500m², with open water partially shaded by multi-stemmed crack willow trees on the southern bank of the river. This is a species-rich community consisting of tall-herb fen and swamp vegetation and large areas of bare mud where tree canopy cover is denser. There are dominant stands of reed canary-grass associated with meadowsweet and water mint (*Mentha aquatica*). Lesser pond sedge is locally dominant in addition to reed sweet grass and yellow iris. This vegetation community (Table 36) is a mosaic of the tall herb fen and swamp vegetation stands S28 *Phalaris arundinacea* tall-herb fen (MATCH coefficient of similarity of 46% for Q3 in Table 36). Where the vegetation community has established in shallow standing water the S5 *Glyceria maxima* swamp community is more prevalent (analysis of the combined sample data gave a low MATCH coefficient of similarity of 35% for this community). These communities are typical of water margins and shallow swamps and widely distributed within Britain.

Table 36: NVC frequency table for tall herb fen and swamp mosaic on bank of River Avon

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Salix fragilis</i>	8	9	9	9	8	V (8-9)
<i>Phalaris arundinacea</i>	-	4	9	3	6	IV (3-9)
<i>Iris pseudacorus</i>	6	4	-	4	6	IV (4-6)
<i>Filipendula ulmaria</i>	-	2	-	3	4	III (2-4)
<i>Glyceria maxima</i>	-	7	-	1	-	II (1-7)
<i>Mentha aquatica</i>	-	-	-	6	4	II (4-6)
<i>Carex acutiformis</i>	5	-	-	4	-	II (4-5)
<i>Ranunculus ficaria</i>	-	-	-	8	5	II (5-8)
<i>Urtica dioica</i>	-	-	-	3	3	II (3)
<i>Callitriche stagnalis</i>	-	2	-	-	3	II (2-3)
<i>Rorippa</i> sp.	-	3	-	2	-	II (2-3)
<i>Cardamine pratensis</i>	2	2	-	-	-	II (2)
<i>Myosotis sylvatica</i>	-	-	-	4	-	I (4)
<i>Impatiens glandulifera</i>	-	-	-	3	-	I (3)
<i>Poa trivialis</i>	-	-	-	-	3	I (3)
<i>Scutellaria galericulata</i>	-	2	-	-	-	I (2)
<i>Lycopus europaeus</i>	-	-	-	1	-	I (1)

Crackley Farm Pond (030-PH2-143003)

- 5.4.93 This site consists of a shaded farm pond surrounded by open woodland. It was selected for survey as it is identified as potentially lowland mixed deciduous woodland habitat of principal importance, as well as having a potentially botanically-rich pond. The woodland canopy is composed of pedunculate oak and ash, with hybrid poplar and silver birch also present. Hawthorn and elder dominate the shrub layer with hazel

and holly frequent. The ground flora of the woodland has abundant common nettle and bramble with green alkanet (*Pentaglottis sempervirens*) and rough meadow-grass also frequent. Bittersweet and gypsywort are locally abundant. The pond margins are shaded and there is very little emergent wetland vegetation. The woodland community was identified by the surveyors as in part W10 *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, and part W8 *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland.

Crackley Wood Complex

Site description and reasons for selection for survey

- 5.4.94 This complex of sites includes three ancient woodlands that were once connected, forming a larger woodland. The current site known as Crackley Wood LNR is located to the south of the Kenilworth Greenway (disused railway). However, the OS County Series map of Warwickshire from the 1880s⁴⁵ shows a much larger woodland, under the name of Crackley Wood, extending from the current Crackley Wood in the south to Roughknowles Wood in the north. Since this time, areas of woodland have been converted to arable fields and grassland. The property of Birches Wood Farm has an area of lawn or pasture that was on part of this woodland.
- 5.4.95 The woodlands surveyed include Greens Wood, immediately to the north of the Kenilworth Greenway, a spur of Birches Wood that extends into the arable land on the eastern side, and Roughknowles Wood, which is north of Cryfield Grange Road. All areas are lowland mixed deciduous woodland a Habitat of Principal Importance. The underlying geology is sandstone, part of the Kenilworth Sandstone Formation with superficial deposits of sand and gravel.
- 5.4.96 Roughknowles Wood is currently used at times for grazing pigs, which is indicated by the electric fencing forming pens in parts of the wood.

Crackley Wood North (030-PH2-143002) – vegetation communities

- 5.4.97 The woodland community is characterised by a closed canopy of pedunculate oak and silver birch, which are frequent throughout. There is a stand of sycamore in the west of the site and alder is occasional in the south-east of the site. Sweet chestnut, beech, downy birch (*Betula pubescens*), rowan and some exotics are also present at low abundance. The shrub layer is very dense in the central and eastern parts of the site, with hazel coppice dominating. Hawthorn is only occasionally found, along with elder, rowan and holly. Ash seedlings and saplings are frequent.
- 5.4.98 Bluebell is very abundant in the ground flora and yellow archangel is abundant in some areas where it forms patches of sprawling plants. Bramble is frequent but not abundant, suppressed by the dense shading. Other species occasionally found include creeping soft-grass, male fern, broad buckler-fern, three-nerved sandwort, honeysuckle, wood sorrel, wood millet and enchanter's nightshade.
- 5.4.99 This woodland community (Table 37) is W10a *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, typical sub-community, widespread within established

⁴⁵ Ordnance Survey (1883-1887), County Series Map of Warwickshire, 1:2500 scale.

woodlands on the base-poor soils of lowland Britain. Analysis of the samples set with MATCH gave a high coefficient of similarity for W10a of 63%.

Table 37: NVC frequency table for woodland community at Greens Wood

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	4	4	7	4	4	V (4-7)
<i>Betula pendula</i>	5	6	5	5	2	V (2-6)
<i>Sorbus aucuparia</i>	1	1	-	-	2	III (1-2)
<i>Alnus glutinosa</i>	-	2	2	-	-	II (2)
<i>Acer pseudoplatanus</i>	-	-	-	-	6	I (6)
<i>Castanea sativa</i>	5	-	-	-	-	I (5)
<i>Betula pubescens</i>	-	-	-	-	4	I (4)
<i>Fagus sylvatica</i>	-	1	-	-	-	I (1)
<i>Fraxinus excelsior</i>	-	1	-	-	-	I (1)
<i>Corylus avellana</i>	7	10	10	9	4	V (4-10)
<i>Fagus sylvatica</i>	4	2	1	2	4	V (1-4)
<i>Acer pseudoplatanus</i> (sapling)	1	1	-	2	4	IV (1-4)
<i>Ilex aquifolium</i>	-	-	1	1	2	III (1-2)
<i>Quercus robur</i>	2	1	2	-	-	III (1-2)
<i>Sambucus nigra</i>	-	-	2	1	2	III (1-2)
<i>Sorbus aucuparia</i>	-	1	2	2	-	III (1-2)
<i>Crataegus monogyna</i>	1	-	1	-	-	II (1)
<i>Hyacinthoides non-scripta</i>	10	9	-	6	7	IV (6-10)
<i>Holcus mollis</i>	1	4	-	-	3	III (1-4)
<i>Dryopteris dilatata</i>	-	1	2	2	-	III (1-2)
<i>Lonicera periclymenum</i>	-	1	2	2	-	III (1-2)
<i>Rubus fruticosus</i> agg.	1	2	2	-	-	III (1-2)
<i>Lamium galeobdolon</i> ssp. <i>montanum</i>	-	-	7	5	-	II (5-7)
<i>Circaea lutetiana</i>	-	-	4	-	3	II (3-4)
<i>Oxalis acetosella</i>	-	3	4	-	-	II (3-4)
<i>Dryopteris filix-mas</i>	-	1	2	-	-	II (1-2)
<i>Milium effusum</i>	-	1	1	-	-	II (1)
<i>Ribes rubrum</i>	-	-	4	-	-	I (4)
<i>Moehringia trinervia</i>	-	-	3	-	-	I (3)
<i>Veronica montana</i>	-	-	-	-	3	I (3)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Anemone nemorosa</i>	-	2	-	-	-	I (2)
<i>Galeopsis tetrahit</i>	-	-	2	-	-	I (2)
<i>Poa trivialis</i>	-	-	2	-	-	I (2)
<i>Urtica dioica</i>	-	-	-	2	-	I (2)
<i>Ajuga reptans</i>	-	-	1	-	-	I (1)
<i>Digitalis purpurea</i>	-	-	-	-	1	I (1)
<i>Galium aparine</i>	-	-	1	-	-	I (1)
<i>Populus tremula</i> (sucker)	-	-	1	-	-	I (1)
<i>Rubus idaeus</i>	-	-	1	-	-	I (1)
<i>Scrophularia nodosa</i>	-	-	-	-	1	I (1)

Birches Wood (030-PH2-143001) – vegetation communities

- 5.4.100 The woodland canopy of Birches Wood within the Cryfield Grange Farm property is dominated by pedunculate oak, with occasional alder and downy birch. Ash is locally prominent but not generally abundant. Coppice hazel is the most abundant species in the shrub layer, although there is no sign of recent management. Hawthorn and elder are frequent shrubs, and there is occasional grey willow, holly, blackthorn and field maple.
- 5.4.101 In the ground flora, bramble is abundant and locally dominant, with bluebell also abundant. Yellow archangel is locally abundant. Other species that are prominent include enchanter's nightshade, ground ivy, creeping soft-grass, rough meadow-grass, broad buckler-fern, common nettle, cleavers, red campion and wood avens. Wood millet, wood anemone, dog's mercury and thin-spiked wood-sedge (*Carex strigosa*) are present at low abundance.
- 5.4.102 This woodland community (Table 38) is W10a *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, typical sub-community. MATCH gave a poor coefficient of similarity for this sub-community, but it was determined in the field to be W10a, due to the assemblage of species present.

Table 38: NVC frequency table for woodland community at Birches Wood

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	1	8	2	5	9	V (1-9)
<i>Alnus glutinosa</i>	8	1	4	4	1	V (1-8)
<i>Betula pubescens</i>	5	5	1	-	4	IV (1-5)
<i>Fraxinus excelsior</i>	-	-	8	7	-	II (7-8)
<i>Corylus avellana</i>	6	4	7	7	6	V (4-7)
<i>Crataegus monogyna</i>	2	4	-	6	1	IV (1-6)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Sambucus nigra</i>	5	2	2	-	4	IV (2-4)
<i>Acer pseudoplatanus</i>	2	-	1	1	1	IV (1-2)
<i>Prunus spinosa</i>	1	-	4	-	-	II (1-4)
<i>Acer campestre</i>	-	-	1	1	-	I (1)
<i>Lonicera periclymenum</i>	-	3	-	-	-	I (3)
<i>Cornus sanguinea</i>	-	-	-	2	-	I (2)
<i>Ilex aquifolium</i>	-	2	-	-	-	I (2)
<i>Salix cinerea</i>	-	-	2	-	-	I (2)
<i>Rubus fruticosus</i> agg.	4	9	3	1	3	V (1-9)
<i>Hyacinthoides non-scripta</i>	1	3	4	-	9	IV (1-9)
<i>Holcus mollis</i>	-	4	2	5	5	IV (2-5)
<i>Dryopteris dilatata</i>	2	2	2	-	2	IV (2)
<i>Lamium galeobdolon</i> ssp. <i>montanum</i>	6	-	9	-	4	III (4-9)
<i>Poa trivialis</i>	4	-	4	5	-	III (4-5)
<i>Glechoma hederacea</i>	1	-	5	4	-	III (3-5)
<i>Circaea lutetiana</i>	4	3	3	-	-	III (3-4)
<i>Urtica dioica</i>	8	-	-	5	-	II (5-8)
<i>Galium aparine</i>	7	-	-	3	-	II (3-7)
<i>Silene dioica</i>	-	-	1	3	-	II (1-3)
<i>Geum urbanum</i>	-	-	1	2	-	II (1-2)
<i>Deschampsia cespitosa</i>	-	-	-	4	-	I (4)
<i>Milium effusum</i>	-	-	3	-	-	I (3)
<i>Carex remota</i>	-	-	-	2	-	I (2)
<i>Filipendula ulmaria</i>	-	-	-	2	-	I (2)
<i>Hedera helix</i>	-	2	-	-	-	I (2)
<i>Mercurialis perennis</i>	-	-	2	-	-	I (2)
<i>Anemone nemorosa</i>	-	-	1	-	-	I (1)
<i>Dryopteris filix-mas</i>	-	1	-	-	-	I (1)
<i>Galeopsis tetrahit</i>	-	-	1	-	-	I (1)
<i>Juncus effusus</i>	-	-	-	1	-	I (1)
<i>Lonicera periclymenum</i>	-	1	-	-	-	I (1)
<i>Rumex sanguineus</i>	-	-	-	1	-	I (1)

Birches Wood Plantation (030-PH2-143004)

- 5.4.103 This strip of woodland alongside Crackley Lane was selected for survey as it is identified as potentially lowland mixed deciduous woodland habitat of principal importance. A brief walkover survey of this site was undertaken. The canopy is composed of young (20-30 years) planted ash, beech and cherry, and there is a sparse ground flora of common nettle, cleavers, rough meadow-grass and wood dock. Due to this woodland being of recent planted origin, it was not considered to be habitat of principal importance and a full NVC survey was not undertaken.

Roughknowles Wood (030-PH2-144002) – vegetation communities

- 5.4.104 Past management and the actions of the pigs that have been grazed in this woodland have resulted in a marked contrast between Roughknowles Wood and Birches Wood or Greens Wood. The canopy is dominated by frequent but scattered pedunculate oak with dense growth of young downy birch and locally frequent young Scots pine. Wild cherry is prominent locally, in stands derived from suckering old trees. Ash and sycamore are present but rare at the site. Young birch, pine and oak form a shrub layer, with hazel occasionally present, and rowan, holly and hawthorn very occasionally found.
- 5.4.105 The ground flora is distinctive due to the dominance of foxglove (*Digitalis purpurea*) in large patches (presumably due to the grazing out of other species by pigs). Bracken is locally dominant where pigs have been excluded. Bluebell is present throughout, although not necessarily dominating, and bramble, red current, three-nerved sandwort, red campion and wood millet are also frequently encountered.
- 5.4.106 This woodland community (Table 39) is a modified form of W10a *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, typical sub-community. MATCH gave a high coefficient of similarity of 54% for this sub-community.

Table 39: NVC frequency table for woodland community at Roughknowles Wood

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	5	9	8	8	9	V (5-9)
<i>Pinus sylvestris</i>	1	1	1	1	2	V (1-2)
<i>Betula pubescens</i>	7	1	-	2	2	IV (1-7)
<i>Prunus avium</i>	-	2	1	-	-	II (1-2)
<i>Fraxinus excelsior</i>	1	1	-	-	-	II (1)
<i>Acer pseudoplatanus</i>	1	-	-	-	-	I (1)
<i>Quercus robur</i>	-	-	4	4	5	III (4-5)
<i>Corylus avellana</i>	-	1	2	2	-	III (1-2)
<i>Betula</i> sp.	-	-	-	2	5	II (2-5)
<i>Pinus sylvestris</i>	-	2	2	-	-	II (2)
<i>Crataegus monogyna</i>	-	-	1	1	-	II (1)
<i>Ilex aquifolium</i> (sapling)	-	1	1	-	-	II (1)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Acer pseudoplatanus</i>	-	-	-	1	-	I (1)
<i>Sorbus aucuparia</i>	-	-	-	1	-	I (1)
<i>Digitalis purpurea</i>	9	10	5	3	6	V (3-10)
<i>Pteridium aquilinum</i>	1	2	4	8	8	V (1-8)
<i>Hyacinthoides non-scripta</i>	3	2	4	3	2	V (2-4)
<i>Rubus fruticosus</i> agg.	2	2	3	2	3	V (2-3)
<i>Milium effusum</i>	2	2	-	1	1	IV (1-2)
<i>Moehringia trinervia</i>	2	-	1	2	-	III (1-2)
<i>Rubus idaeus</i>	2	1	-	-	-	II (1-2)
<i>Silene dioica</i>	2	-	1	-	-	II (1-2)
<i>Agrostis capillaris</i>	-	-	1	-	1	II (1)
<i>Chamerion angustifolium</i>	-	-	1	-	1	II (1)
<i>Dryopteris dilatata</i>	-	1	1	-	-	II (1)
<i>Holcus mollis</i>	-	-	-	2	-	1 (2)
<i>Urtica dioica</i>	2	-	-	-	-	I (2)
<i>Cerastium fontanum</i>	-	-	1	-	-	I (1)
<i>Epilobium montanum</i>	-	-	1	-	-	I (1)

Broadwells Wood (030-PH2-144001)

Site description and reasons for selection for survey

- 5.4.107 Broadwells Wood is ancient woodland that is located between Crackley Wood and the village of Burton Green. It is a LWS in Warwickshire, and is also lowland mixed deciduous woodland, a Habitat of Principal Importance. The woodland is relatively large (17.6ha) and is comprised of mature standards of pedunculate oak, birch and ash, together with some conifers and sycamore, over an understorey of hazel coppice, holly and hawthorn. The underlying geology, Tile Hill mudstones, consists of interbedded clays and sandstones, formed during the Carboniferous era. The soils are reddish, clayey loams with slowly permeable subsoils belonging to the Whimple 2 Association, so that lower parts of the site are subject to seasonal waterlogging.
- 5.4.108 To the south, the woodland is better drained along a shallow, north-east facing slope. There are ponds, depressions and flushes present in the lower parts of the wood. Streams flow through the centre of the wood and around the north-east perimeter. Well-developed wood banks are also present along the southern parish boundary and also adjacent to the stream on the north-east boundary. Former rides have been neglected and grown over, and in places the understorey is very sparse and the canopy is relatively open.
- 5.4.109 The woodland appears to have been cut during the Second World War, as indicated on aerial photos from 1945. It is likely that the woodland was planted with stands of

broadleaved trees and conifers after this period. An area of 1.5ha has been cleared recently and replanted with oak, ash and cherry along the north-western edge. There is evidence of pheasant rearing (old pheasant pens) and shooting (a high seat), the latter of which is likely to have been the reason for the removal of a certain amount of the understorey vegetation.

Vegetation communities present

- 5.4.110 The woodland canopy is composed of pedunculate and ash standards. Planted Scots pine, Norway spruce (*Picea abies*), common larch, sweet chestnut and sycamore are also present. The main woodland community (Table 40) is W10a *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, typical sub-community, which has bluebell, bracken and bramble dominant in the field layer (with a high MATCH coefficient of 53%). Immediately adjacent to the streams, ponds and wetter depressions, the vegetation is influenced by moister and more base-rich conditions with abundant tufted hair-grass and lesser celandine, and occasional patches of wood anemone, opposite-leaved golden-saxifrage (*Chrysosplenium oppositifolium*), enchanter's nightshade, common marsh-bedstraw (*Galium palustre*) and cuckoo flower (*Cardamine pratensis*). This woodland community is W8b *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Anemone nemorosa* sub-community. This wood anemone sub-community (W8b) is a more south-easterly distributed in Britain, common on heavy base-rich soils, but is less common and more scattered in distribution in Warwickshire, the Midlands and north-west Britain.

Table 40: NVC frequency table for the woodland community at Broadwells Wood

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	5	8	7	7	7	V (5-8)
<i>Betula pendula</i>	5	4	-	5	5	IV (4-5)
<i>Picea abies</i>	4	-	5	5	-	III (4-5)
<i>Fraxinus excelsior</i>	-	-	-	5	4	II (4-5)
<i>Pinus sylvestris</i>	3	-	4	-	-	II (3-4)
<i>Acer pseudoplatanus</i>	-	-	-	-	5	I (5)
<i>Acer campestre</i>	4	-	-	-	-	I (4)
<i>Betula pubescens</i>	-	4	-	-	-	I (4)
<i>Larix decidua</i>	-	-	4	-	-	I (4)
<i>Corylus avellana</i>	5	8	5	7	4	V (4-8)
<i>Ilex aquifolium</i>	2	5	-	5	5	IV (2-5)
<i>Lonicera periclymenum</i>	-	2	-	1	2	III (1-2)
<i>Crataegus monogyna</i>	-	-	-	1	4	II (1-4)
<i>Acer pseudoplatanus</i>	-	-	4	-	5	II (4-5)
<i>Acer campestre</i>	-	-	2	-	-	I (2)
<i>Sambucus nigra</i>	-	-	2	-	-	I (2)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Hyacinthoides non-scripta</i>	10	8	2	8	9	V (2-10)
<i>Rubus fruticosus</i> agg.	3	8	8	9	5	V (3-9)
<i>Dryopteris dilatata</i>	-	3	-	1	2	III (1-3)
<i>Holcus lanatus</i>	4	-	-	-	2	II (2-4)
<i>Pteridium aquilinum</i>	8	-	-	-	-	I (8)
<i>Fraxinus excelsior</i> (seedling)	-	-	-	-	2	I (2)
<i>Galium aparine</i>	2	-	-	-	-	I (2)

- 5.4.111 Elsewhere in the wood, other sub-communities of these two woodland communities are present in small stands. W10b *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, *Anemone nemorosa* sub-community is present in the south-west of the site, and W10e *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, *Acer pseudoplatanus*-*Oxalis acetosella* sub-community found in the north of the site. Both these sub-communities are locally distributed within Britain, the wood anemone sub-community (W10b) found mainly in the south-east on heavy soils, and the sycamore-wood sorrel sub-community (W10e) mainly found as a transition to upland woodland communities in the north and west of Britain. As such, these sub-communities occurring together represent a relatively unique situation. W8e *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Geranium robertianum* sub-community was present in the south of the site, where there is a sycamore and ash canopy and a number of species associated with the wood bank on the southern boundary, including three-nerved sandwort, wood avens and wood speedwell (*Veronica montana*). This herb-Robert sub-community (W8e) is characteristic of the north and west of England and Wales, and has a more scattered distribution in the Midlands and further south.
- 5.4.112 Hybrid poplars have been planted by the stream, where alder is also frequent in the canopy. Two young, small-leaved lime trees are present on the northern boundary, which may have been planted. Other very infrequent tree species included wild apple, situated near the central dividing stream, English elm suckers, wych elm and occasional rowan.

Black Waste Wood (030-PH2-146002/030-PH2-146005)

Site description and reasons for selection for survey

- 5.4.113 Black Waste Wood is ancient woodland and lowland mixed deciduous woodland, a Habitat of Principal Importance. It is located east of Burton Green and north of the Kenilworth Greenway. The main woodland site is 7.7ha in size, and slopes gently towards the south-east, bounded by the gardens of houses in Burton Green to the west, and by arable fields and pasture along the northern and eastern perimeters. A small stream runs through the lower (southern) part of the site, and there are minor wood banks running along parts of the eastern boundary.
- 5.4.114 The 1945 aerial photo indicates that large sections of the main wood were cut over during the Second World War, and obviously planted, even-aged oak standards are

now present, along with mature birch and hawthorn in the canopy. There appears to have been little recent management. The north-western part of the site has been replanted with pine.

- 5.4.115 A single compartment alongside the Greenway south of the main body Black Waste Wood was also surveyed, which lies at the rear of a property on Cromwell Lane. Although adjacent and connected to Black Waste Wood, this compartment is not Ancient Woodland, but is lowland mixed deciduous woodland a Habitat of Principal Importance.
- 5.4.116 The underlying geology is mainly of Tile Hill mudstone, consisting of Carboniferous deposits of interbedded sandstones and clays. These give rise to loamy soils of the Whimple 2 Association (Bromsgrove Series), which usually are slowly permeable, with slight seasonal waterlogging. Some areas with coarser-textured profiles are better drained.

Black Waste Wood (030-PH2-146002) – vegetation communities

- 5.4.117 The main body of Black Waste Wood has a canopy of pedunculate oak, silver birch, downy birch and rowan, with an understorey of holly, hawthorn, hazel and honeysuckle. The field layer has abundant bracken and bluebell. This woodland community (Table 41) is W10a *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, typical sub-community (with a high MATCH coefficient of 54%), typical of base-poor situations in lowland Britain. In the south-west of this site, the woodland community is influenced by clearings and edge effects, although along this boundary were several large specimens of wild apple and ancient hazel stools.

Table 41: NVC frequency table for the woodland community at Black Waste Wood

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	7	5	9	6	7	V (5-9)
<i>Betula pubescens</i>	4	5	-	5	7	IV (4-7)
<i>Fraxinus excelsior</i>	7	4	-	4	4	IV (4-7)
<i>Sorbus aucuparia</i>	2	-	1	4	-	III (1-4)
<i>Betula pendula</i>	-	7	4	-	-	II (4-7)
<i>Crataegus monogyna</i> (canopy)	4	-	4	-	-	II (4)
<i>Salix caprea</i>	-	-	-	2	3	II (2-3)
<i>Alnus glutinosa</i>	-	-	-	-	4	I (4)
<i>Populus tremula</i>	-	-	-	4	-	I (4)
<i>Corylus avellana</i>	7	8	3	6	7	V (3-8)
<i>Ilex aquifolium</i>	5	2	3	5	5	V (2-5)
<i>Crataegus monogyna</i> (shrub)	4	4	4	3	4	V (3-4)
<i>Lonicera periclymenum</i>	1	4	1	4	-	IV (1-4)
<i>Hedera helix</i>	2	-	2	-	-	II (2)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Betula pendula</i> (sapling)	-	-	-	-	3	I (3)
<i>Sambucus nigra</i>	-	-	-	2	-	I (2)
<i>Quercus robur</i> (sapling)	-	2	-	-	-	I (2)
<i>Rubus fruticosus</i> agg.	7	8	8	9	7	V (7-9)
<i>Hyacinthoides non-scripta</i>	2	5	7	4	9	V (2-9)
<i>Pteridium aquilinum</i>	-	4	2	4	3	IV (2-4)
<i>Dryopteris filix-mas</i>	1	-	-		5	II (1-5)
<i>Dryopteris dilatata</i>	1	4	-	-	-	II (1-4)
<i>Ilex aquifolium</i> (seedling)	2	-	1	-	-	II (1-2)
<i>Fraxinus excelsior</i> (seedling)	3	-	-	-	-	I (3)
<i>Hedera helix</i>	2	-	-	-	-	I (2)

- 5.4.118 A narrow belt along the stream and a few seepage areas supported a canopy of ash with occasional alder. The field layer in the vicinity of the stream contained lesser celandine, garlic mustard (*Alliaria petiolata*), tufted hair-grass, narrow buckler-fern (*Dryopteris carthusiana*) and hairy wood-rush (*Luzula pilosa*).
- 5.4.119 Throughout the wood, patches of bare ground were relatively common under heavy shade cast by the canopy and as well as bracken, other ferns were relatively abundant, including scaly male-fern (*Dryopteris affinis*). In the north of the site, Scots pine had been planted along the ownership boundary over an impoverished field layer. However, rowan is abundant in this area. The wood bank and ditch along the north-east facing boundary contained rough meadow-grass, cleavers and wood avens, with occasional large wild apple and field maple trees.

Black Waste Wood South (030-PH2-146005) – vegetation communities

- 5.4.120 This woodland compartment has a canopy of mixed ash and pedunculate oak with a few silver birch and downy birch. One or two substantial small-leaved limes are present close to the eastern boundary, which appear to have been coppiced in the past. The shrub layer is relatively dense and includes stands of hazel, plus scattered holly, hawthorn, rowan and blackthorn. In the north of the compartment, towards Black Waste Wood, the canopy becomes open and dominated by birch.
- 5.4.121 The ground flora is variable dependent on the amount of shading caused by the canopy and shrub layers. In the heavily shaded areas in the south of the site and on the eastern boundary, shade-tolerant woodland species, including some ancient woodland indicators, are present. The most abundant species are bramble, ivy, and bluebell, the latter being very abundant. Yellow archangel is locally prominent, forming patches; and bracken is very abundant under the open birch canopy in the north of the compartment. Also present is wood speedwell, wood anemone, enchanter's nightshade, wood sorrel, wood sedge, scaly male-fern, primrose and broad-leaved helleborine (*Epipactis helleborine*).

- 5.4.122 This woodland community (Table 42) is primarily *W10c Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Hedera helix* sub-community (with a very high MATCH coefficient of similarity of 64%), which is present where there is a closed canopy. It is likely that this grades to *W10d Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Holcus lanatus* sub-community in the north of the compartment where it joins the greater part of Black Waste Wood. These sub-communities are variations of the typical sub-community, widespread on base-poor soils in the British lowlands, and relatively common where traditional woodland management is no longer undertaken.

Table 42: NVC frequency table for the woodland compartment in the south of Black Waste Wood

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Fraxinus excelsior</i>	5	4	7	4	6	V (4-7)
<i>Quercus robur</i>	4	7	4	5	7	V (4-7)
<i>Tilia cordata</i>	-	4	5	4	-	III (4-5)
<i>Betula pubescens</i>	4	-	4	-	-	II (4)
<i>Salix caprea</i>	2	-	-	-	4	II (2-4)
<i>Betula pendula</i>	-	-	-	4	-	I (4)
<i>Ilex aquifolium</i>	1	2	2	4	4	V (1-4)
<i>Crataegus monogyna</i>	2	2	1	2	1	V (1-2)
<i>Corylus avellana</i>	5	8	-	5	8	IV (5-8)
<i>Sorbus aucuparia</i>	2	-	5	-	2	III (2-5)
<i>Prunus spinosa</i>	1	-	1	-	1	III (1)
<i>Sambucus nigra</i> (sapling)	1	1	-	-	1	III (1)
<i>Fraxinus excelsior</i> (sapling)	3	2	-	-	-	II (2-3)
<i>Acer pseudoplatanus</i>	-	-	-	1	-	I (1)
<i>Rubus fruticosus</i> agg.	2	6	9	4	4	V (2-9)
<i>Hedera helix</i>	3	8	5	3	3	V (3-8)
<i>Hyacinthoides non-scripta</i>	2	3	3	1	6	V (1-6)
<i>Pteridium aquilinum</i>	2	-	4	5	2	IV (2-5)
<i>Lamiastrum galeobdolon</i> ssp. <i>montanum</i>	3	4	-	-	7	III (3-7)
<i>Circaea lutetiana</i>	4	2	-	-	4	III (2-4)
<i>Holcus mollis</i>	-	-	-	8	8	II (8)
<i>Oxalis acetosella</i>	8	-	-	-	6	II (6-8)
<i>Lonicera periclymenum</i>	2	-	8	-	-	II (2-8)
<i>Fraxinus excelsior</i> (seedling)	-	6	-	-	2	II (2-6)
<i>Urtica dioica</i>	3	-	-	-	4	II (3-4)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Deschampsia cespitosa</i>	4	1	-	-	-	II (1-4)
<i>Dryopteris dilatata</i>	2	-	-	-	2	II (2)
<i>Geum urbanum</i>	2	2	-	-	-	II (2)
<i>Ribes rubrum</i>	2	-	1	-	-	II (1-2)
<i>Viola riviniana</i>	4	-	-	-	-	I (4)
<i>Veronica montana</i>	3	-	-	-	-	I (3)
<i>Carex sylvatica</i>	-	2	-	-	-	I (2)
<i>Stachys sylvatica</i>	2	-	-	-	-	I (2)
<i>Angelica sylvestris</i>	-	-	-	-	1	I (1)
<i>Digitalis purpurea</i>	-	-	-	-	1	I (1)
<i>Dryopteris affinis</i>	1	-	-	-	-	I (1)
<i>Epilobium roseum</i>	-	-	-	-	1	I (1)
<i>Epipactis helleborine</i>	1	-	-	-	-	I (1)
<i>Galium aparine</i>	-	-	-	-	1	I (1)
<i>Poa trivialis</i>	-	-	1	-	-	I (1)
<i>Primula vulgaris</i>	1	-	-	-	-	I (1)
<i>Rosa arvensis</i>	-	-	1	-	-	I (1)
<i>Tamus communis</i>	1	-	-	-	-	I (1)

Kenilworth Greenway (030-PH2-146001/030-PH2-146004)

Site description and reasons for selection for survey

- 5.4.123 Kenilworth Greenway is a potential LWS in Warwickshire. It is a disused railway corridor that has been resurfaced and is used as a foot and cycle path. The cuttings and embankments of the Greenway are now mainly wooded, although small patches of coarse grassland are present.

Vegetation communities present

- 5.4.124 The linear woodland that is found either side of the Kenilworth Greenway has a canopy of semi-mature pedunculate oak and ash. Silver birch and goat willow are scattered throughout, and sycamore is frequent at one location. In the shrub layer there is abundant hawthorn, with hazel, elder, grey willow frequent. Other shrub species such as dog rose and holly are occasionally found.
- 5.4.125 In the ground flora there is common shade-tolerant woodland flora under the canopy, and there are patches where the canopy is thin, where more typical open-ground species occur. This is noticeable on the margin of the path itself, where there is a linear strip of mixed woodland and ruderal vegetation. The woodland flora included wood avens, bramble, common nettle, ivy, herb-Robert, enchanter's nightshade and rough meadow-grass.

- 5.4.126 This woodland community (Table 43) is considered to be in transition from W21 *Crataegus monogyna*-*Hedera helix* scrub to W10c *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, *Hedera helix* sub-community, both typical of early successional woodland and widespread in lowland Britain. MATCH analysis gave a relatively high coefficient of similarity of 50% for this latter sub-community.

Table 43: NVC frequency table for woodland alongside Kenilworth Greenway

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	8	9	5	9	7	V (5-9)
<i>Fraxinus excelsior</i>	5	4	4	2	2	V (2-5)
<i>Betula pendula</i>	2	2	7	-	-	III (2-7)
<i>Salix caprea</i>	2	-	1	2	-	III (1-2)
<i>Acer pseudoplatanus</i>	-	-	-	-	7	I (7)
<i>Crataegus monogyna</i>	7	7	4	8	2	V (2-8)
<i>Corylus avellana</i>	-	2	2	-	-	II (2)
<i>Sambucus nigra</i>	2	2	-	-	-	II (2)
<i>Salix caprea</i>	-	1	2	-	-	II (1-2)
<i>Rosa canina</i>	-	-	-	2	-	I (2)
<i>Crataegus laevigata</i>	-	-	-	1	-	I (1)
<i>Ilex aquifolium</i>	-	-	-	-	1	I (1)
<i>Viburnum opulus</i>	-	-	1	-	-	I (1)
<i>Geum urbanum</i>	6	3	5	3	3	V (2-6)
<i>Rubus fruticosus</i> agg.	4	4	2	2	4	V (2-4)
<i>Urtica dioica</i>	4	-	4	4	4	IV (4)
<i>Hedera helix</i>	-	-	8	10	10	III (8-10)
<i>Rosa arvensis</i>	-	4	4	4	-	III (4)
<i>Geranium robertianum</i>	-	-	3	3	2	III (2-3)
<i>Poa trivialis</i>	3	2	2	-	-	III (2-3)
<i>Circaea lutetiana</i>	-	-	3	1	1	III (1-3)
<i>Dryopteris filix-mas</i>	-	4	-	1	-	II (1-4)
<i>Bromopsis ramosa</i>	-	-	2	1	-	II (1-2)
<i>Epilobium montanum</i>	2	1	-	-	-	II (1-2)
<i>Alopecurus pratensis</i>	-	2	-	-	-	I (2)
<i>Veronica chamaedrys</i>	-	-	2	-	-	I (2)
<i>Veronica montana</i>	-	-	-	2	-	I (2)
<i>Vicia sepium</i>	-	2	-	-	-	I (2)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Brachypodium sylvaticum</i>	1	-	-	-	-	I (1)
<i>Dactylis glomerata</i>	1	-	-	-	-	I (1)
<i>Dryopteris dilatata</i>	-	1	-	-	-	I (1)
<i>Galium aparine</i>	1	-	-	-	-	I (1)
<i>Myosotis arvensis</i>	1	-	-	-	-	I (1)
<i>Primula vulgaris</i>	-	1	-	-	-	I (1)
<i>Rumex sanguineus</i>	-	-	1	-	-	I (1)

5.4.127 Where the trees and shrubs are absent, there is a small length of open grassland. This is tall and rank, with a high proportion of herbaceous species. These include false oat-grass, red fescue, cock's-foot, hogweed, common nettle, common knapweed (*Centaurea nigra*), perforate St. John's-wort (*Hypericum perforatum*), yarrow (*Achillea millefolium*) and hairy tare (*Vicia hirsuta*).

5.4.128 This vegetation community (Table 44) is the common MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub community (MATCH coefficient of similarity of 45%), typical of unmanaged grassland on nutrient-rich soil and the margins of road and railway infrastructure.

Table 44: NVC frequency table for grassland community alongside Kenilworth Greenway

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Arrhenatherum elatius</i>					9	I (9)
<i>Hypericum perforatum</i>					4	I (4)
<i>Rubus fruticosus</i> agg.					4	I (4)
<i>Achillea millefolium</i>					3	I (3)
<i>Galium aparine</i>					3	I (3)
<i>Vicia hirsuta</i>					3	I (3)
<i>Centaurea nigra</i>					2	I (2)
<i>Dactylis glomerata</i>					2	I (2)
<i>Festuca rubra</i> agg.					2	I (2)
<i>Holcus lanatus</i>					2	I (2)
<i>Leucanthemum vulgare</i>					2	I (2)
<i>Ranunculus repens</i>					2	I (2)
<i>Urtica dioica</i>					2	I (2)
<i>Heracleum sphondylium</i>					1	I (1)
<i>Lamium album</i>					1	I (1)
<i>Malva moschata</i>					1	I (1)

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Plantago lanceolata</i>					1	I (1)
<i>Silene dioica</i>					1	I (1)
<i>Sonchus asper</i>					1	I (1)

Little Poors Wood (030-PH2-146003)

Site description and reasons for selection for survey

- 5.4.129 Little Poors Wood is a small deciduous woodland of 1.2ha in size located at Burton Green, Warwickshire. In the northwest corner of the woodland is a very small pond (0.1ha in size) and to the east of the woodland are houses. The woodland is not classified as Ancient Woodland on the Natural England inventory but is lowland mixed deciduous woodland, a habitat of principal importance.

Vegetation communities present

- 5.4.130 The woodland community has a canopy of mature pedunculate oak (up to 25m in height) with occasional silver birch. In the understorey, neglected hazel coppice is locally dominant with occasional rowan. The shrub layer is well developed and consisting of bramble, hawthorn, midland hawthorn, elder and occasional holly. There are some clearings dominated by bracken and replanted with young trees.
- 5.4.131 The ground flora is well developed but limited to a few species indicative of acidic ground conditions including bracken, broad buckler-fern, creeping soft-grass and bluebell. There are a few garden escape species including the invasive variegated yellow-archangel and cultivated daffodils (*Narcissus* sp.). Bank haircap-moss (*Polytrichum formosum*) and carpet moss (*Mnium hornum*) are locally abundant.
- 5.4.132 The pond is 90% shaded by trees and scrub. Floating sweet grass (*Glyceria fluitans*) is dominant within the pond and remote sedge and carpet moss are found on the edges of the pond.
- 5.4.133 The woodland community (Table 45) is *W10c Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Hedera helix* sub-community (with a relatively high MATCH coefficient of similarity of 57%), a sub-community typical of unmanaged woodland, and widespread in the British lowlands.

Table 45: NVC frequency table for Little Poors Wood

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	8	10	10	7	6	V (6-10)
<i>Sorbus aucuparia</i>	-	-	-	2	-	I (2)
<i>Betula pendula</i>	1	-	-	-	-	I (1)
<i>Ilex aquifolium</i>	-	2	7	4	2	IV (2-7)
<i>Crataegus monogyna</i>	1	2	-	-	2	III (1-2)
<i>Sorbus aucuparia</i>	-	4	7	-	-	II (4-7)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Corylus avellana</i>	-	-	-	6	4	II (4-6)
<i>Betula pendula</i> (sapling)	-	-	1	-	1	II (1)
<i>Sambucus nigra</i>	-	1	-	-	-	I (1)
<i>Rubus fruticosus</i> agg.	-	10	10	9	-	III (9-10)
<i>Kindbergia praelonga</i>	-	2	2	3	-	III (2-3)
<i>Brachythecium rutabulum</i>	-	2	2	2	-	III (2)
<i>Pteridium aquilinum</i>	10	3	-	-	-	II (3-10)
<i>Hyacinthoides non-scripta</i>	-	3	-	2	-	II (2-3)
<i>Polytrichum formosum</i>	-	-	-	-	9	I (9)
<i>Holcus lanatus</i>	-	-	-	-	4	I (4)
<i>Holcus mollis</i>	4	-	-	-	-	I (4)
<i>Lonicera periclymenum</i>	-	-	-	4	-	I (4)
<i>Dryopteris dilatata</i>	-	-	2	-	-	I (2)
<i>Juncus effusus</i>	-	-	-	-	1	I (1)
<i>Luzula campestris</i>	-	-	-	-	2	I (2)

CFA19 Coleshill Junction

Wheeley Moor Farm Meadows LWS (030-PH2-161003)

Site description and reasons for selection for survey

- 5.4.134 This site is composed of three fields within the River Cole flood plain. The site is bordered in the south and east by the river, within a U-shaped bend, and bordered in the north by the A4114 Birmingham Road. The site is designated as a LWS in Warwickshire and includes lowland meadow, a habitat of principal importance.
- 5.4.135 The southernmost and middle fields are meadow, mown for hay and separated from each other by a defunct hedge. The northernmost of the three fields is grazed by horses and is separated by the middle field by a fence.

Vegetation communities present

- 5.4.136 The southernmost and middle meadows had a sward with an average height of 0.5m at the time of survey, a fairly open structure, and sparse litter layer. In the southernmost meadow there are extensive areas of bare or sparsely vegetated ground that is indicative of some form of recent disturbance.
- 5.4.137 This grassland community has frequent red fescue, rough meadow-grass, sweet vernal-grass (*Anthoxanthum odoratum*), Yorkshire-fog, ribwort plantain (*Plantago lanceolata*) and meadow buttercup. There are frequent patches of great burnet (*Sanguisorba officinalis*) and meadow foxtail. Also present are meadow saxifrage (*Saxifraga granulata*), lady's bedstraw (*Galium verum*), oxeye daisy (*Leucanthemum*

vulgare) and pignut. This grassland community (Table 46) was identified in the field as MG4 *Alopecurus pratensis*-*Sanguisorba officinalis* grassland.

- 5.4.138 These once common grasslands are now scarce, and now only occur in scattered location in the Midlands and southern England. They can be very variable in composition, reflecting their management history and the extent of inundation.

Table 46: NVC frequency table for middle meadow at Wheeley Moor Farm Meadows LWS

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Sanguisorba officinalis</i>	8	8	8	8	7	V (7-8)
<i>Festuca rubra</i> agg.	6	5	5	6	5	V (5-6)
<i>Rumex acetosa</i>	1	1	2	3	3	V (1-3)
<i>Arrhenatherum elatius</i>	3	3	4	-	4	IV (3-4)
<i>Poa pratensis</i>	3	4	-	2	3	IV (2-4)
<i>Anthoxanthum odoratum</i>	1	3	3	4	-	IV (1-4)
<i>Alopecurus pratensis</i>	4	5	-	-	6	III (4-6)
<i>Holcus lanatus</i>	4	3	-	3	-	III (3-4)
<i>Plantago lanceolata</i>	2	-	2	4	-	III (2-4)
<i>Ranunculus bulbosus</i>	-	-	4	4	2	III (2-4)
<i>Ranunculus acris</i>	-	1	1	1	-	III (1)
<i>Dactylis glomerata</i>	2	-	-	-	2	II (2)
<i>Agrostis capillaris</i>	-	-	4	-	-	I (4)
<i>Centaurea nigra</i>	-	-	4	-	-	I (4)
<i>Lotus corniculatus</i>	-	-	3	-	-	I (3)
<i>Cerastium fontanum</i>	2	-	-	-	-	I (2)
<i>Conopodium majus</i>	-	-	1	-	-	I (1)
<i>Saxifraga granulata</i>	-	-	-	1	-	I (1)
<i>Taraxacum</i> agg.	-	1	-	-	-	I (1)

- 5.4.139 Bisecting the two southern fields are dry ditches approximately 1m wide and 0.4m deep. The ditches support the coarse grassland communities MG1a *Arrhenatherum elatius* grassland: *Urtica dioica* sub-community and MG9 *Holcus lanatus*-*Deschampsia cespitosa* grassland, both typical of unmanaged situations. The latter community is common in permanently moist and periodically inundated fields and widespread in the British lowlands
- 5.4.140 The most northerly field is horse-grazed pasture characterised by a very short, closed sward with patches of bare ground created by trampling. The field has a shallow central ditch and a few small hollows connected to the ditch. The field is part of the same grassland as the middle field but has a modified composition due to continuous grazing. Red fescue, great burnet, ribwort plantain, and meadow buttercup are

present here but Yorkshire fog and creeping bent (*Agrostis stolonifera*) are more prevalent. Common ragwort (*Senecio jacobaea*), creeping thistle and docks (*Rumex* spp.) are also present. Although the composition of the grassland is different to that of the other fields in this site, the presence of greater burnet, red fescue, Yorkshire fog, ribwort plantain and meadow buttercup indicates that the grassland is a disturbed and somewhat degraded form of MG4 *Alopecurus pratensis*-*Sanguisorba officinalis* grassland.

- 5.4.141 The ditch and associated hollows that runs from north to south across the field supports a community that is fragmented because of trampling by horses. The vegetation within the ditch is characterised by the abundance of creeping buttercup and lesser spearwort (*Ranunculus flammula*) in association with abundant creeping bent and frequent hairy sedge (*Carex hirta*) and Yorkshire fog. This grassland community was identified as MG13 *Agrostis stolonifera* – *Alopecurus geniculatus* grassland, a widespread community of periodically inundated grassland sites in the British lowlands. There is also a patch of amphibious bistort (*Persicaria amphibia*) which forms the A10 *Polygonum amphibium* community.

Coleshill Hall Farm Meadows (including Coleshill Hall Farm LWS) (030-PH2-160001)

Site description and reasons for selection for survey

- 5.4.142 This site is composed of four fields east of the River Cole and south of Coleshill Hall Farm. The most westerly and southerly fields are meadows, whereas the other two fields in the east of the site are horse-grazed. The two fields in the north-east of the site are designated as a Coleshill Hall Farm LWS in Warwickshire and include lowland meadow, a habitat of principal importance.

Vegetation communities present

- 5.4.143 The western meadow is alongside the river and is characterised by the abundance of tall grasses and a low diversity and cover of herbs. This grassland community has abundant false oat-grass, red fescue and frequent Yorkshire-fog. Meadow foxtail, sweet vernal-grass and soft brome (*Bromus hordeaceus*) are locally frequent. This grassland community (Table 47) was identified as MG9b *Holcus lanatus*-*Deschampsia cespitosa* grassland, *Arrhenatherum elatius* sub-community (MATCH coefficient of similarity of 50%), which is common in permanently moist and periodically inundated fields, and widespread in the British lowlands. Despite the absence of tufted hair-grass, an abundance of Yorkshire fog and the presence of meadow foxtail indicate this community.

Table 47: NVC frequency table for meadow adjacent to the River Cole south of Coleshill Hall Farm

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Arrhenatherum elatius</i>	6	4	5	5	8	V (4-8)
<i>Festuca rubra</i> agg.	5	3	7	4	3	V (3-7)
<i>Holcus lanatus</i>	3	6	4	-	3	IV (3-6)
<i>Poa trivialis</i>	5	-	3	2	2	IV (2-5)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Trifolium pratense</i>	-	6	4	2	-	III (2-6)
<i>Cerastium fontanum</i>	-	-	2	2	1	III (1-2)
<i>Anthoxanthum odoratum</i>	-	5	-	3	-	II (3-5)
<i>Rumex crispus</i>	-	1	1	-	-	II (1)
<i>Geranium dissectum</i>	-	-	1	-	1	II (1)
<i>Taraxacum</i> agg.	-	-	1	-	1	II (1)
<i>Ranunculus repens</i>	-	-	-	7	-	I (7)
<i>Bromus hordeaceus</i>	-	-	5	-	-	I (5)
<i>Phleum pratense</i>	-	-	-	5	-	I (5)
<i>Alopecurus pratensis</i>	-	2	-	-	-	I (2)
<i>Ranunculus acris</i>	-	-	1	-	-	I (1)
<i>Rumex acetosa</i>	-	-	-	1	-	I (1)
<i>Veronica serpyllifolia</i>	-	-	-	1	-	I (1)

- 5.4.144 The southern meadow is located on flat land and is characterised by an open structure with a near continuous litter layer and an average height of 0.6m. Within the grassland, false oat grass, red fescue, rough meadow-grass and meadow foxtail are constant components with tufted hair-grass and sweet vernal-grass being locally frequent. The cover of herbs is occasional and relatively species poor. This grassland community is MG1a *Arrhenatherum elatius* grassland, *Festuca rubra* sub-community, a common sub-community of recently established and unmanaged coarse grasslands, widespread in lowland Britain
- 5.4.145 In the western corner of this field is a small low-lying area with a stand of lesser pond-sedge. Herbs such as creeping thistle, common nettle and great willowherb are also present, indicating that the land is becoming drier. This is S7 *Carex acutiformis* swamp, a locally distributed community in lowland Britain, often found in small and fragmented stands in permanently wet situations. However, the presence of uncharacteristic tall-herb species in the sample, that are not generally associated with swamps, resulted in a relatively poor fit to this NVC community.
- 5.4.146 In the east of the site is horse-grazed pasture which is Coleshill Hall Farm LWS. These fields have a very short sward less than 0.05m high. Common bent (*Agrostis capillaris*), red fescue, bird's-foot trefoil (*Lotus corniculatus*) and rough meadow grass are present and extensive parts of the field contain common nettle, thistles (*Cirsium* spp.) and broad-leaved dock (*Rumex obtusifolius*). There are low-lying areas which appear to be a relic ditch system. But the vegetation does not differ significantly in these features to elsewhere in the field. The predominant vegetation community (Table 48) in this field was identified as MG6b *Lolium perenne*-*Cynosurus cristatus* grassland, *Anthoxanthum odoratum* sub-community (with a high MATCH coefficient of similarity of 57%), a very common grassland of predominantly agricultural, permanent pasture in Britain.

Table 48: NVC frequency table for grassland community with the eastern field of Coleshill Hall Farm LWS

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Festuca rubra</i> agg.	8	5	6	4	4	V (4-8)
<i>Agrostis capillaris</i>	3	4	4	2	3	V (2-4)
<i>Plantago lanceolata</i>	4	5	4	-	4	IV (4-5)
<i>Ranunculus bulbosus</i>	4	4	5	-	5	IV (4-5)
<i>Cynosurus cristatus</i>	4	4	5	-	3	IV (3-5)
<i>Trifolium repens</i>	3	4	5	3	-	IV (3-5)
<i>Carex hirta</i>	3	2	2	-	3	IV (2-3)
<i>Rumex acetosa</i>	2	2	1	-	1	IV (1-2)
<i>Poa trivialis</i>	-	-	4	7	4	III (4-7)
<i>Lotus corniculatus</i>	3	7	-	-	5	III (3-7)
<i>Lolium perenne</i>	4	-	-	4	4	III (4)
<i>Dactylis glomerata</i>	4	-	3	-	3	III (3-4)
<i>Achillea millefolium</i>	2	2	-	-	4	III (2-4)
<i>Potentilla reptans</i>	4	-	1	-	3	III (1-4)
<i>Holcus lanatus</i>	1	3	-	-	-	II (1-3)
<i>Prunella vulgaris</i>	1	-	-	-	2	II (1-2)
<i>Cirsium arvense</i>	-	-	-	5	-	I (5)
<i>Rumex obtusifolius</i>	-	-	-	5	-	I (5)
<i>Ranunculus repens</i>	-	-	-	3	-	I (3)
<i>Galium verum</i>	2	-	-	-	-	I (2)
<i>Poa annua</i>	-	-	-	2	-	I (2)
<i>Plantago major</i>	-	-	-	1	-	I (1)
<i>Scorzoneroide autumnalis</i>	-	-	-	-	1	I (1)

Field North-East of Hall Walk (030PH2-161002)

Site description and reasons for selection for survey

- 5.4.147 This site is an L-shaped pasture field which gently slopes from north to south with a series of undulations running in parallel from north-west to south-east that may be ridge-and-furrow. The field is grazed by horses and has an average sward height of 0.05m.

Vegetation communities present

- 5.4.148 Crested dog's-tail and white clover are constant throughout the community, with self-heal (*Prunella vulgaris*), common mouse ear (*Cerastium fontanum*) and common sorrel frequent. Also present are red fescue and cock's-foot, and a low cover of perennial

rye-grass and ribwort plantain. This grassland community was identified as MG6b *Lolium perenne*-*Cynosurus cristatus* grassland, *Anthoxanthum odoratum* sub-community. This community is a virtually ubiquitous community of the British lowlands.

River Cole and Meadows (030-PH2-161004) including Field North of South Drive (030-PH2-162002)

Site description and reasons for selection for survey

- 5.4.149 This site consists of five large pasture fields either side of the River Cole north of the B4114 Birmingham Road near Coleshill. The fields were surveyed due to their potential to include lowland meadow a Habitat of Principal Importance, similar to the habitat found in the meadows south of the Birmingham Road. These fields are grazed by cattle.
- 5.4.150 The River Cole is a potential LWS in Warwickshire and is a habitat of principal importance.

Vegetation communities present

- 5.4.151 Four of the largest fields that are in the west and north of the site are similar in floral composition and have the same grassland community. Red fescue, meadow foxtail, Yorkshire fog, rough meadow-grass and sweet vernal-grass are abundant or frequent, and the associated herb species include meadow buttercup, creeping buttercup, common sorrel, yarrow, white clover, dandelion (*Taraxacum* agg.) and creeping thistle. Most notable was pignut, which is constant at low abundance throughout all fields indicating that the grassland is long established and has not been ploughed and re-seeded. Other evidence for this is the fact that perennial rye-grass is absent suggesting that the fields have had some improvement by addition of fertiliser but not re-seeded. This grassland community (Table 49) throughout the four largest fields is MG7d *Lolium perenne*-*Alopecurus pratensis* grassland (with a MATCH coefficient of similarity of 55%). This community is characteristic of permanent pasture on moist and fertile alluvial soils in lowland river valleys of Britain and can be very extensive, possibly replacing MG4 in some areas.

Table 49: NVC frequency table for pasture fields alongside the River Cole north of Birmingham Road

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Festuca rubra</i> agg.	8	6	6	6	6	V (6-8)
<i>Holcus lanatus</i>	7	7	6	5	6	V (5-7)
<i>Poa pratensis</i>	3	3	5	4	3	V (3-5)
<i>Trifolium repens</i>	2	3	3	5	4	V (2-5)
<i>Ranunculus acris</i>	4	-	5	6	5	IV (4-6)
<i>Dactylis glomerata</i>	4	6	-	4	4	IV (4-6)
<i>Alopecurus pratensis</i>	-	4	4	5	4	IV (4-5)
<i>Rumex acetosa</i>	3	2	-	2	4	IV (2-4)
<i>Taraxacum</i> agg.	1	-	1	2	3	IV (1-3)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Trifolium pratense</i>	2	4	-	2	-	III (2-4)
<i>Achillea millefolium</i>	1	-	3	3	-	III (1-3)
<i>Conopodium majus</i>	2	-	-	2	-	II (2)
<i>Anthoxanthum odoratum</i>	3	-	-	-	-	I (3)
<i>Cirsium arvense</i>	1	-	-	-	-	I (1)
<i>Poa annua</i>	-	1	-	-	-	I (1)
<i>Senecio jacobaea</i>	-	-	-	-	1	I (1)
<i>Ranunculus bulbosus</i>	-	-	-	-	1	I (1)
<i>Cerastium fontanum</i>	-	-	-	-	1	I (1)

- 5.4.152 The fifth field of this site, and the furthest east, adjacent to Coleshill Hall Farm includes a dry remnant of a moat (which is 2m deep and 3m wide). This field is also cattle-grazed pasture with a short and uniform sward. Red fescue, crested dog's-tail, rough meadow-grass, Yorkshire-fog and meadow foxtail are frequent or abundant, with white clover, bulbous buttercup (*Ranunculus bulbosus*), yarrow and creeping thistle occasional or locally frequent. Pignut is absent from this field, as is perennial rye-grass, indicating a lack of re-seeding as with the other fields at the site. The grassland community (Table 50) is MG6a *Lolium perenne*-*Cynosurus cristatus* grassland, typical sub-community (MATCH coefficient of 56%), a very common agricultural pasture grassland in Britain.

Table 50: NVC frequency table for pasture field adjacent to Coleshill Hall Farm north of Birmingham Road

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Festuca rubra</i> agg.	7	7	6	6	5	V (5-7)
<i>Cynosurus cristatus</i>	5	7	3	4	5	V (3-7)
<i>Poa pratensis</i>	5	4	6	5	4	V (4-6)
<i>Holcus lanatus</i>	5	3	6	5	5	V (3-6)
<i>Trifolium repens</i>	5	4	4	5	2	V (2-5)
<i>Alopecurus pratensis</i>	4	-	5	5	5	IV (4-5)
<i>Dactylis glomerata</i>	4	3	-	3	4	IV (3-4)
<i>Poa annua</i>	3	5	1	-	-	III (1-5)
<i>Ranunculus bulbosus</i>	2	-	3	-	4	III (2-4)
<i>Ranunculus repens</i>	-	2	-	3	-	II (2-3)
<i>Achillea millefolium</i>	-	-	1	1	-	II (1)
<i>Cirsium arvense</i>	-	-	-	-	5	I (5)
<i>Anthoxanthum odoratum</i>	-	-	3	-	-	I (3)
<i>Cerastium fontanum</i>	-	-	-	1	-	I (1)

- 5.4.153 The moat was heavily poached by cattle and bare ground was frequent. The base of the moat supports a grassland community dominated by creeping bent, generally less than 0.1m high, with fairly low botanical diversity. Also abundant are creeping buttercup, rough meadow-grass, annual meadow-grass (*Poa annua*) and marsh foxtail. This grassland community (Table 51) is MG13 *Agrostis stolonifera*-*Alopecurus geniculatus* grassland (with a high MATCH coefficient of 58%), a widespread community of periodically inundated grassland sites in the British lowlands, although floating sweet-grass (*Glyceria fluitans*) and rushes (*Juncus* spp.), which are common components of this community, are absent.

Table 51: NVC frequency table for grassland community within moat adjacent to Coleshill Hall Farm north of Birmingham Road

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Agrostis stolonifera</i>	7	8	8	7	8	V (7-8)
<i>Ranunculus repens</i>	6	5	5	7	6	V (5-7)
<i>Poa trivialis</i>	5	5	4	5	4	V (4-5)
Bare ground	5	5	4	5	4	V (4-5)
<i>Alopecurus geniculatus</i>	3	3	3	3	3	V (3)
<i>Poa annua</i>	3	3	3	3	2	V (2-3)
<i>Carex hirta</i>	2	-	-	2	1	III (1-2)
<i>Cardamine pratensis</i>	-	1	2	-	-	II (1)
<i>Holcus lanatus</i>	-	-	4	-	-	I (4)
<i>Plantago major</i>	1	-	-	-	-	I (1)
<i>Rumex crispus</i>	-	-	1	-	-	I (1)

- 5.4.154 There is a ditch system within the fields west of the river. This ditch is often open and grassy but retains water and joins a small pond surrounded by hawthorn scrub. The open ditch has the abundant floating sweet-grass and marsh foxtail and both MG13 *Agrostis stolonifera*-*Alopecurus geniculatus* grassland and the less common S22c *Glyceria fluitans* water-margin vegetation, *Alopecurus geniculatus* sub-community are present. The deeper pools and pond have abundant common water-starwort forming the A16a *Callitriche stagnalis* community, *Callitriche* spp. sub-community, which is typical of eutrophic standing waters and widely distributed in Britain.
- 5.4.155 In the far north of the site is a sixth field north of South Drive (030-PH2-162002), which is cattle-grazed pasture with a uniform structure and very short sward height. The grassland is dominated by perennial rye-grass and has a limited botanical diversity. This grassland is MG7b *Lolium perenne*-*Poa trivialis* ley, characteristic of seeded, permanent pasture.
- 5.4.156 The River Cole itself north of the Birmingham Road is flanked by vegetation of variable width dependant on whether the riverbank is fenced or livestock are allowed access to the river. Fenced sections and the sections that are flanked by woodland are characterised by a mixed community of scrub and tall-herb stands. Wherever livestock

have access to the river, the marginal vegetation is poorly defined and aquatic vegetation is much-more limited.

- 5.4.157 The river channel has occasional river water-crowfoot (*Ranunculus fluitans*) and curled pondweed (*Potamogeton crispus*). This forms the aquatic A18 *Ranunculus fluitans* community, found in eutrophic rivers with moderate flow rates, and locally distributed in Britain. The river margin has extensive stands of reed canary-grass which forms the S28a *Phalaris arundinacea* tall-herb fen, typical sub-community, common on riverbanks. The riverbank vegetation is open and the flora composition variable. Where stands of undisturbed grassland or tall ruderal herbs persist then the grassland community MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community and the open vegetation community OV24 *Urtica dioica-Galium aparine* community are present in mosaics. These communities are common in undisturbed open areas of high nutrient soils.

The Catmore and The Belt (within Coleshill Park Belt LWS) (030-PH2-162001, 030-PH2-163002)

Site description and reasons for selection for survey

- 5.4.158 This site includes two adjoining woodlands (totalling 4.7ha) that form a wooded strip north of Coleshill Hall. The sites are designated as a LWS in Warwickshire, and contain lowland mixed deciduous woodland, a habitat of principal importance. The Catmore is orientated approximately north-south and The Belt east-west. Both areas have relatively flat topography, but the southern end of The Catmore slopes gently down to a stream. Neither wood is listed as Ancient Woodland on the Natural England inventory.
- 5.4.159 The underlying geology is of Permo-Triassic reddish mudstone, with glaciofluvial drift deposits of till located towards the north-eastern part of The Belt. The greater part of both sites is covered by fine, loamy, slowly permeable and seasonally waterlogged soils, while on the glaciofluvial drift are coarse and loamy soils, affected by groundwater. Much of the canopy has been planted with broadleaf and conifer mixtures, while there is a semi-natural understorey surviving in places. Rhododendron is common in The Belt, probably planted for amenity in the manor grounds, and there are occasional non-native trees.

The Catmore (030-PH2-162001) – vegetation communities

- 5.4.160 In The Catmore pedunculate oak and Japanese larch (*Larix kaempferi*) are present in the rather open canopy. The ground flora was dominated by bluebell, bramble, wood millet and cleavers. In the south of the woodland, ash and field maple are present in the canopy and dog's mercury, pignut and herb-Robert are found in the field layer.
- 5.4.161 The woodland community (Table 52) was generally close to W10a *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, typical sub-community (MATCH coefficient of 44%), typical of establish woodland on base-poor soils and widely distributed within lowland Britain. However, the south of the woodland (Q1) was similar to W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland, typical of established woodland on more base-rich situations, and also widely distributed within the British lowlands. The distribution of W10 and W8 woodland communities

reflects small variations in moisture and fertility, with W8 more prevalent on more low-lying, moister soils and W10 on drier, freer-draining soils.

Table 52: NVC frequency table for The Catmore

Species	Quadrat locations					Constancy (Domin range)
		Q1	Q2	Q3	Q4	
<i>Quercus robur</i>		8	8	9	9	IV (8-9)
<i>Acer campestre</i>		5	-	-	-	I (5)
<i>Fraxinus excelsior</i>		5	-	-	-	I (5)
<i>Crataegus monogyna</i>		4	-	-	-	I (4)
<i>Larix kaempferi</i>		-	-	-	4	I (4)
<i>Quercus cerris</i>		-	-	4	-	I (4)
<i>Hedera helix</i> (shrub)		4	3	2	2	IV (2-4)
<i>Quercus robur</i> (sapling)		2	1	3	2	IV (1-3)
<i>Crataegus monogyna</i> (shrub)		5	3	-	5	III (3-5)
<i>Sambucus nigra</i>		4	1	-	1	III (1-4)
<i>Acer campestre</i>		4	-	1	-	II (1-4)
<i>Corylus avellana</i>		5	-	-	-	I (5)
<i>Betula pendula</i>		-	-	4	-	I (4)
<i>Ulmus procera</i>		-	-	3	-	I (3)
<i>Prunus spinosa</i>		3	-	-	-	I (3)
<i>Betula pubescens</i>		-	-	2	-	I (2)
<i>Fraxinus excelsior</i> (sapling)		2	-	-	-	I (2)
<i>Ilex aquifolium</i>		-	-	-	1	I (1)
<i>Hyacinthoides non-scripta</i>		9	5	4	7	IV (4-9)
<i>Rubus fruticosus</i> agg.		6	8	6	8	IV (6-8)
<i>Milium effusum</i>		4	5	7	4	IV (4-7)
<i>Galium aparine</i>		5	4	4	5	IV (4-5)
<i>Stellaria holostea</i>		8	5	4	-	III (4-8)
<i>Hedera helix</i> (ground)		-	3	3	-	II (3)
<i>Pteridium aquilinum</i>		-	7	-	-	I (7)
<i>Moehringia trinervia</i>		-	-	-	5	I (5)
<i>Arrhenatherum elatius</i>		-	3	-	-	I (3)
<i>Geranium robertianum</i>		3	-	-	-	I (3)
<i>Holcus mollis</i>		-	-	3	-	I (3)
<i>Chamerion angustifolium</i>		-	2	-	-	I (2)

Species	Quadrat locations					Constancy (Domin range)
		Q1	Q2	Q3	Q4	
<i>Fraxinus excelsior</i> (seedling)		-	2	-	-	I (2)
<i>Alliaria petiolata</i>		1	-	-	-	I (1)
<i>Crataegus monogyna</i> (seedling)		-	-	-	1	I (1)
<i>Silene dioica</i>		-	-	-	1	I (1)

The Belt (030-PH2-163002) – vegetation communities

- 5.4.162 The vegetation of The Belt is also varied but the pedunculate oak canopy is denser than at The Catmore. Hawthorn and hazel are frequent in the understorey, extending in places into the canopy, together with elder. Wych elm is present along the wood bank that runs along the northern boundary of this woodland. The field layer is dominated by bluebell and bramble. In lower-lying areas at the western edge of the wood there is Indian balsam indicating a higher water table in this area, but the rest of the woodland soil is reasonably well-drained.
- 5.4.163 An area of The Belt has a canopy of mature hawthorn scrub with dog's mercury dominant in the field layer, along with frequent red campion, lesser celandine and wood avens. False brome, rough meadow-grass, garlic mustard and hedge woundwort are present along the south-facing perimeter.
- 5.4.164 The woodland communities (Table 53) are a mosaic of W10c *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, *Hedera helix* sub-community (MATCH coefficient of 51%), typical of unmanaged woodland and widespread in lowland Britain, and W8 *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland dependant on the soil conditions with the W8 community found in more moist areas similar to that found at The Catmore.

Table 53: NVC frequency table for The Belt

Species	Quadrat locations					Constancy (Domin range)
		Q1	Q2	Q3	Q4	
<i>Quercus robur</i>		4	10	9	8	IV (4-10)
<i>Crataegus monogyna</i>		4	4	6	-	III (4-6)
<i>Corylus avellana</i>		8	3	-	-	II (3-8)
<i>Betula pendula</i>		4	-	-	4	II (4)
<i>Acer campestre</i>		5	-	-	-	I (5)
<i>Larix kaempferi</i>		-	-	-	5	I (5)
<i>Ulmus glabra</i>		5	-	-	-	I (5)
<i>Populus x canadensis</i>		-	-	1	-	I (1)
<i>Crataegus monogyna</i>		6	5	4	2	IV (2-6)
<i>Sambucus nigra</i>		3	5	5	2	IV (2-5)
<i>Corylus avellana</i>		-	5	5	-	II (5)
<i>Ilex aquifolium</i>		-	-	-	3	I (3)

Species	Quadrat locations					Constancy (Domin range)
		Q1	Q2	Q3	Q4	
<i>Ulmus glabra</i>		5	-	2	-	II (2-5)
<i>Betula pendula</i>		1	2	-	-	II (1-2)
<i>Rhododendron ponticum</i>		4	-	-	-	I (4)
<i>Lonicera periclymenum</i>		-	3	-	-	I (3)
<i>Acer pseudoplatanus</i>		1	-	-	-	I (1)
<i>Hyacinthoides non-scripta</i>		9	10	9	9	IV (9-10)
<i>Rubus fruticosus</i> agg.		8	6	5	9	IV (5-9)
<i>Galium aparine</i>		4	2	-	-	II (2-4)
<i>Dryopteris filix-mas</i>		4	-	-	-	I (4)
<i>Urtica dioica</i>		2	-	-	-	I (2)
<i>Acer campestre</i> (seedling)		-	1	-	-	I (1)
<i>Crataegus monogyna</i> (seedling)		-	-	1	-	I (1)
<i>Fraxinus excelsior</i> (seedling)		-	1	-	-	I (1)
<i>Geum urbanum</i>		-	1	-	-	I (1)

Green Lane, Coleshill (within Coleshill Park Belt LWS) (030-PH2-163003)

Site description and reasons for selection for survey

- 5.4.165 Green Lane, Coleshill is a woodland strip (10m wide) along a public right of way that is included in a Warwickshire LWS with The Catmore and The Belt. It is situated north of Coleshill Manor alongside the M42 motorway spur.

Vegetation communities present

- 5.4.166 The woodland strip has a dense cover of scrub species up to 2.5m in height. The dominant woody species is hawthorn, with bramble and elder frequent. A canopy of mature trees is also dense in some areas reaching a height of 25m including the frequent standard trees of pedunculate oak, hazel and English elm. Wych elm, ash and field maple are less frequent in the canopy. Other less dominant species of the scrub layer include blackthorn and holly. The ground flora is diverse and contains a number of woodland ground flora species including abundant wood avens, common feather moss and common nettle, with common bent, garlic mustard and wood dock (*Rumex sanguineus*) frequent. The more typical hedgerow species recorded at low frequencies include red campion, greater stitchwort (*Stellaria holostea*), false brome and upright hedge-parsley (*Torilis japonica*).
- 5.4.167 This vegetation community (Table 54) is W21a *Crataegus monogyna*-*Hedera helix* scrub, *Hedera helix*-*Urtica dioica* sub-community (MATCH gave a high coefficient of similarity of 51%), which is a widespread and typical vegetation community of hedges in the British Isles.

Table 54: NVC frequency table for woodland strip at Green Lane, Coleshill

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	5	-	7	-	6	III (5-7)
<i>Ulmus procera</i>	5	5	-	4	-	III (4-5)
<i>Corylus avellana</i>	4	4	-	-	3	III (3-4)
<i>Fraxinus excelsior</i>	-	-	-	1	6	II (1-6)
<i>Acer campestre</i>	-	-	6	-	-	I (6)
<i>Crataegus monogyna</i>	8	5	7	6	8	V (5-8)
<i>Sambucus nigra</i>	4	5	4	2	2	V (2-5)
<i>Ulmus glabra</i>	3	5	-	7	2	IV (2-7)
<i>Prunus spinosa</i>	2	-	5	-	-	II (2-5)
<i>Ilex aquifolium</i>	-	5	5	-	-	I (5)
<i>Urtica dioica</i>	8	7	6	8	2	V (2-8)
<i>Rubus fruticosus</i> agg.	4	6	7	1	6	V (1-7)
<i>Geum urbanum</i>	2	4	2	2	3	V (2-4)
<i>Kindbergia praelonga</i>	8	9	4	1	-	IV (1-9)
<i>Agrostis capillaris</i>	5	8	3	-	-	III (5-8)
<i>Hedera helix</i>	-	-	1	7	7	III (1-7)
<i>Alliaria petiolata</i>	-	-	2	6	3	III (2-6)
<i>Dactylis glomerata</i>	2	-	5	-	3	III (2-5)
<i>Rumex sanguineus</i>	3	1	1	-	-	III (1-3)
<i>Brachypodium sylvaticum</i>	-	-	-	3	4	II (3-4)
<i>Stellaria holostea</i>	-	-	3	-	4	II (3-4)
<i>Silene dioica</i>	-	-	-	1	4	II (1-4)
<i>Heracleum sphondylium</i>	3	-	-	1	-	II (1-3)
<i>Anthriscus sylvestris</i>	-	-	-	-	8	I (8)
<i>Galium aparine</i>	-	-	3	-	-	I (3)
<i>Dryopteris filix-mas</i>	2	-	-	-	-	I (2)
<i>Torilis japonica</i>	-	-	-	2	-	I (2)
<i>Myosotis sylvatica</i>	-	2	-	-	-	I (2)
<i>Rosa canina</i>	-	1	-	-	-	I (1)

Dodder's Oak, Gilson (030-PH2-163001)

- 5.4.168 The 'Dodder's Oak' at Gilson is a veteran pedunculate oak tree that was surveyed to verify its location and species as part of the Phase 2 NVC surveys. It is identified as a

potential Local Wildlife Site in Warwickshire. The vernacular name came from a local resident and tenant of the field in which it grows.

Coleshill Sewage Works Meadow South (Coleshill Sewage Works Grassland LWS) (030-PH2-164001)

Site description and reasons for selection for survey

- 5.4.169 Coleshill Sewage Works Meadow South encompasses an area of land to the south of the River Tame, that is part of the Sewage Works complex, but non-operational land. About 10ha is rush pasture established around a seasonally wet drain that had expanded to flood a large area at the time of survey. There are muddy, sparsely-vegetated banks surrounding this inundated area, and swamp vegetation has established in depressions that retain moisture throughout the year.
- 5.4.170 In the south-west of the site there is neutral grassland that is partially grazed by rabbits. There are small stands of young planted broad-leaved woodland that are fenced.

Vegetation communities present

- 5.4.171 The rush pasture is a dense tussocky structure dominated by soft rush, marsh bedstraw, marsh thistle (*Cirsium palustre*) and water mint. Other frequently occurring species include hairy sedge, water forget-me-not and marsh willowherb (*Epilobium palustre*). This is the mire community (Table 55) M23b *Juncus effusus/acutiflorus*-*Galium palustre* rush pasture, *Juncus effusus* sub-community. This community is typical of neutral to acidic soils that remain moist for most of the year, widespread in western Britain, and locally distributed elsewhere. MATCH gave a relatively low coefficient of similarity of 41%, but identification of this community was confirmed by the surveyor from field observations.

Table 55: NVC frequency table for rush pasture community at Coleshill Sewage Works Meadow South

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Juncus effusus</i>	7	1-	1-	1-	8	V (7-1-)
<i>Epilobium ciliatum</i>	2	3	4	1	7	V (1-7)
<i>Galium palustre</i>	4	6	5	6	3	V (3-6)
<i>Deschampsia cespitosa</i>	9	-	3	1	-	III (1-9)
<i>Ranunculus repens</i>	-	3	3	-	6	III (3-6)
<i>Mentha aquatica</i>	-	-	2	3	5	III (2-5)
<i>Cirsium palustre</i>	3	-	-	2	3	III (2-3)
<i>Carex hirta</i>	-	-	1	-	7	II (1-7)
<i>Lychnis flos-cuculi</i>	-	-	4	2	-	II (2-4)
<i>Epilobium palustris</i>	-	1	3	-	-	II (1-3)
<i>Juncus articulatus</i>	-	1	-	-	1	II (1)
<i>Lysimachia nummularia</i>	-	-	-	8	-	I (8)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Stellaria alsine</i>	-	-	-	-	8	I (8)
<i>Myosotis scorpioides</i>	-	-	-	-	7	I (7)
<i>Alopecurus geniculatus</i>	-	-	3	-	-	I (3)
<i>Holcus lanatus</i>	3	-	-	-	3	I (3)
<i>Lotus pedunculatus</i>	-	2	-	-	-	I (2)
<i>Urtica dioica</i>	-	-	-	-	2	I (2)
<i>Bidens tripartita</i>	-	-	1	-	-	I (1)

- 5.4.172 Some monotypic swamp communities have established on the margins of the inundated area. There are stands of bulrush, often with common reed (*Phragmites australis*). There is also a large stand of branched bur-reed and isolated patches of reed sweet-grass. This marginal habitat is best described as a mosaic of the vegetation communities S₁₂ *Typha latifolia* swamp, S₄ *Phragmites australis* swamp, S₁₄ *Sparganium erectum* swamp and S₅ *Glyceria maxima* swamp, which are delineated by the dominant species in the stand. These swamp communities are found in local and often fragmented stands in moist to permanently wet situations in lowland Britain.
- 5.4.173 The areas of bare mud caused by frequent inundation of flood water, which prevents permanent establishment of vegetation. In isolated patches, the annual plant redshank (*Persicaria maculosa*) becomes established and there are large stands of bulbous rush (*Juncus bulbosus*). Jointed rush (*Juncus articulatus*), common water-starwort and duckweed (*Lemna minor*) are also present in low abundances. This aquatic community (Table 56) is a species-poor example of A_{24b} *Juncus bulbosus* community, found on shallow, base-poor lake margins, mainly in upland situations and uncommon in the lowlands (MATCH gave a relatively low coefficient of similarity of 31%).

Table 56: NVC frequency table for water margin community established on bare mud at Coleshill Sewage Works Meadow South

Species	Quadrat locations					Constancy (Domin range)
			Q1	Q2	Q3	
<i>Juncus bulbosus</i>			9	9	8	III (8-9)
<i>Callitriche stagnalis</i>			6	3	3	III (3-6)
<i>Lemna minor</i>			4	4	-	II (4)
<i>Juncus effusus</i>			3	1	-	II (1-3)
<i>Juncus articulatus</i>			-	-	6	I (6)
<i>Rumex palustris</i>			-	3	-	I (3)
<i>Polygonum maculosa</i>			2	-	6	I (2)

- 5.4.174 The remainder of the site is tussocky, unmanaged grassland with scattered small trees and scrub. In depressions that remain moist there are patches of Yorkshire fog, false oat grass, tufted hair-grass and common couch. This grassland community is MG9b

Holcus lanatus-*Deschampsia cespitosa* grassland, *Arrhenatherum elatius* sub-community, common in permanently moist and periodically inundated fields, and widespread in the British lowlands. In the west of the site there is drier grassland with localised grazing by rabbits. False oat grass is dominant here, with red fescue and herbaceous species including bird's-foot trefoil, yarrow, black knapweed, hare's-foot clover (*Trifolium arvense*), and red clover. This grassland community (Table 57) is the relatively species-rich MG1e *Arrhenatherum elatius* grassland, *Centaurea nigra* sub-community.

Table 57: NVC frequency table for dry grassland in the west of Coleshill Sewage Works Meadow South

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Arrhenatherum elatius</i>	5	5	9	10	10	V (5-10)
<i>Dactylis glomerata</i>	5	7	7	-	-	III (5-7)
<i>Centaurea nigra</i>	4	2	4	-	-	III (2-4)
<i>Festuca rubra</i>	8	7	-	-	-	II (7-8)
<i>Lotus corniculatus</i>	7	8	-	-	-	II (7-8)
<i>Achillea millefolium</i>	7	-	2	-	-	II (2-7)
<i>Trifolium pratense</i>	2	5		-	-	II (2-5)
<i>Potentilla reptans</i>	-	2	2	-	-	II (2)
<i>Plantago lanceolata</i>	-	5	-	-	-	I (5)
<i>Rubus fruticosus</i> agg.	-	1	-	-	-	I (2)
<i>Trifolium arvense</i>	-	2	-	-	-	I (2)
<i>Cerastium montanum</i>	-	1	-	-	-	I (1)
<i>Heracleum sphondylium</i>	-	1	-	-	-	I (1)
<i>Leontodon autumnalis</i>	-	1	-	-	-	I (1)
<i>Stellaria media</i>	-	-	-	1	-	I (1)

Curdworth Bridge Meadow South (030-PH2-164003)

Site description and reasons for selection for survey

- 5.4.175 This site is a triangle of land between the River Tame, to the north, the Water Orton to Kingsbury rail line to the south-east and the A446 Lichfield Road to the west. The site is dominated by unmanaged grassland over 1m tall, with stands of common nettle.

Vegetation communities present

- 5.4.176 The grassland is dominated by false oat grass. On the edges of this community common nettle is locally dominant in association with false oat grass and creeping thistle. This grassland community (Table 58) is a mosaic of MG1b *Arrhenatherum elatius* grassland *Urtica dioica* sub-community (with a high MATCH coefficient of 61%) and OV24a *Urtica dioica*-*Galium aparine* community, typical sub-community depending on the dominance of nettles. Both these communities are common in undisturbed open areas of high nutrient soils.

Table 58: NVC frequency table for the grassland and open vegetation community at Curdworth Bridge Meadow South

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Urtica dioica</i>	5	7	9	8	9	V (5-9)
<i>Arrhenatherum elatius</i>	7	6	8	4	8	V (4-8)
<i>Galium aparine</i>	2	5	-	3	-	III (2-5)
<i>Cirsium arvense</i>	2	-	-	3	-	II (2-3)
<i>Impatiens glandulifera</i>	1	1	-	-	-	II (2)
<i>Tanacetum vulgare</i>	6	-	-	-	-	I (6)
<i>Agrostis capillaris</i>	-	-	6	-	-	I (6)
<i>Dactylis glomerata</i>	-	-	2	-	-	I (6)
<i>Festuca rubra</i>	-	6	-	-	-	I (6)
<i>Achillea millefolium</i>	-	-	2	-	-	I (2)
<i>Elytrigia repens</i>	7	-	-	-	-	I (2)
<i>Artemisia vulgaris</i>	-	-	1	-	-	I (1)
<i>Heracleum sphondylium</i>	1	-	-	-	-	I (1)
<i>Matricaria recutita</i>	-	-	-	1	-	I (1)
<i>Stellaria media</i>	-	-	-	1	-	I (1)

River Tame (030-PH2-164006)

Site description and reasons for selection for survey

- 5.4.177 The River Tame forms the southern boundary of this area and the Proposed Scheme crosses the River at Coleshill Sewage Works.

Vegetation communities present

- 5.4.178 The River Tame on the southern bank is lined with mature black poplar (*Populus nigra*). The black poplar trees are up to 30m in height and over 1m DBH (diameter at breast height).
- 5.4.179 The southern banks of the River Tame are vegetated with tall ruderal and tall herb communities dominated by common nettle, false oat grass and cleavers. Tansy (*Tanacetum vulgare*) and Indian balsam are frequent. These communities are a mosaic of MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community and OV24b *Urtica dioica*-*Galium aparine* community, *Arrhenatherum elatius*-*Rubus fruticosus* agg. sub-community. Both these communities are ubiquitous throughout lowland Britain, typical of high nutrient areas.
- 5.4.180 On the northern side of the river there are steep banks covered with dense tall ruderal vegetation dominated by common nettle and bramble characteristic of a high nutrient environment. There is abundant Indian balsam and stands of lesser burdock (*Arctium minor*), hemlock (*Conium maculatum*), giant hogweed (*Heracleum mantegazzianum*) and rose-bay willowherb (*Chamerion angustifolium*). Great mullein (*Verbascum*

thapsus) and reed canary-grass are occasionally present within this vegetation. This vegetation community (Table 59) is OV24a *Urtica dioica*-*Galium aparine* community, typical sub-community.

Table 59: NVC frequency table for tall ruderal community found in on the bank of the River Leam at Coleshill Sewage Works

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Impatiens glandulifera</i>					8	I (8)
<i>Urtica dioica</i>					6	I (6)
<i>Arctium minus</i>					5	I (5)
<i>Phalaris arundinacea</i>					2	I (2)
<i>Persicaria amphibia</i>					1	I (1)
<i>Rorippa amphibia</i>					1	I (1)
<i>Verbascum thapsus</i>					1	I (1)

- 5.4.181 The banks of the river are steep and there is a very narrow margin available for emergent plants. Only a few patches of reed canary-grass and great yellow-cress (*Rorippa amphibia*) are present. There is an aquatic vegetation community within the river with clumps of river water-crowfoot. This forms the aquatic A18 *Ranunculus fluitans* community, a community primarily found in northern and central England

CFA20 Curdworth to Middleton

Coleshill Sewage Treatment Works

Site description and reasons for selection for survey

- 5.4.182 Coleshill Sewage Treatment Works are bisected by the River Tame and the land to the north of the river is included within the CFA20 (Curdworth to Middleton). This survey site includes a part of Lea Marston Sludge Beds LWS in Warwickshire and contains a mosaic of vegetation communities that are semi-natural or have established on disused gravel settlement beds. In the east of the site are two rows of settlement beds surrounded by 2m high bunds colonised by coarse grassland and tall ruderal species. A surfaced track runs between the rows and there are some areas of concrete hard standing. In the interior of each of the beds is a level area that is typically waterlogged and vegetated with tall grassland, fen and swamp communities. There are also small areas of willow scrub.
- 5.4.183 In the west of the site, there are approximately ten settlement beds with lower bunds (approximately 1m high) and access paths between overgrown with grassy vegetation and scrub. The interior of each of these beds is dominated by grassland and tall ruderal vegetation indicative of waterlogged and high nutrient conditions, and isolated areas that develop seasonal pools of water.

Coleshill Sewage Works East (030-PH2-164004) – vegetation communities

- 5.4.184 The tall unmanaged grassland on the bunds between settlement beds is dominated by species-poor stands of common nettle and false oat-grass. Other frequently recorded species throughout these communities include cleavers, common couch, hemlock, creeping thistle and broad-leaved dock (*Rumex obtusifolius*). These communities are

indicative of unmanaged habitats on high nutrient soils. There is a mosaic of these communities (Table 60 and Table 61) on the drier open ground throughout the site and gradation from pure stands of nettle-dominated OV24a *Urtica dioica*-*Galium aparine* community, typical sub-community (with a high MATCH coefficient of similarity of 61 %) to nettle and grass mixtures OV24b *Urtica dioica*-*Galium aparine* community, *Arrhenatherum elatius*-*Rubus fruticosus* agg. sub-community and MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community.

Table 60: NVC frequency table for nettle-dominated community on bunds around disused sludge beds at Coleshill Sewage Works

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Urtica dioica</i>	9	10	10	4	9	V (4-10)
<i>Conium maculatum</i>	-	4	1	1	4	IV (1-4)
<i>Galium aparine</i>	-	2	1	2	3	IV (1-3)
<i>Cirsium arvense</i>	2	1	-	-	2	III (1-2)
<i>Rumex obtusifolius</i>	1	1	-	-	2	III (1-2)
<i>Arrhenatherum elatius</i>	4	-	-	7	-	II (4-7)
<i>Chamerion angustifolium</i>	1	-	-	7	-	II (1-7)
<i>Agrostis stolonifera</i>	-	-	-	3	3	II (3)
<i>Poa trivialis</i>	3	3	-	-	-	II (3)
<i>Carduus crispus</i>	2	2	-	-	-	II (2)
<i>Lamium album</i>	-	2	-	-	2	II (2)
<i>Senecio jacobaea</i>	2	1	-	-	-	II (1-2)
<i>Elymus repens</i>	-	-	-	5	-	I (5)
<i>Rubus fruticosus</i> agg.	5	-	-	-	-	I (5)
<i>Arctium minus</i>	-	4	-	-	-	I (4)
<i>Impatiens glandulifera</i>	-	-	4	-	-	I (4)
<i>Brachythecium rutabulum</i>	-	-	-	3	-	I (3)
<i>Kindbergia praelonga</i>	-	-	-	3	-	I (3)
<i>Holcus lanatus</i>	2	-	-	-	-	I (2)
<i>Cerastium arvensis</i>	-	-	-	1	-	I (1)
<i>Conyza canadensis</i>	1	-	-	-	-	I (1)
<i>Dactylis glomerata</i>	-	1	-	-	-	I (1)
<i>Reseda luteola</i>	1	-	-	-	-	I (1)
<i>Silene dioica</i>	-	1	-	-	-	I (1)
<i>Tripleurospermum inodorum</i>	1	-	-	-	-	I (1)

Table 61: NVC frequency table for coarse grassland found on bunds and drier areas around disused sludge beds at Coleshill Sewage Works

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Arrhenatherum elatius</i>				10	7	II (7-10)
<i>Urtica dioica</i>				2	6	II (2-6)
<i>Galium aparine</i>				4	1	II (1-4)
<i>Elymus repens</i>				-	7	I (7)
<i>Persicaria amphibia</i>				-	1	I (1)

- 5.4.185 There is one small stand of great willowherb-dominated vegetation community (Table 62), typically found on damper soils in high-nutrient situations. This is OV26e *Epilobium hirsutum* community *Urtica dioica*-*Galium arvense* sub-community which is widespread and common throughout the British lowlands.

Table 62: NVC frequency table for great willowherb-nettle community found in disused sludge beds at Coleshill Sewage Works

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Urtica dioica</i>				10	7	II (7-10)
<i>Epilobium hirsutum</i>				2	6	II (2-6)

- 5.4.186 The interior of the largest settlement bed in the east of the site is dominated by a dense tall sward of bulrush with a limited understorey of bittersweet, great willowherb and gypsywort. This vegetation community (Table 63) is S12a *Typha latifolia* swamp, *Typha latifolia* sub community, a widespread and common community of the British lowlands. Results of the analysis with MATCH analysis gave a low coefficient of similarity of 29.4%, but the field observations confirmed this community type.

Table 63: NVC frequency table swamp community found within large disused sludge beds at Coleshill Sewage Works

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Typha latifolia</i>					10	I (10)
<i>Solanum dulcamara</i>					4	I (4)
<i>Epilobium ciliatum</i>					2	I (2)
<i>Epilobium hirsutum</i>					2	I (2)
<i>Lycopus europaeus</i>					2	I (2)
<i>Persicaria amphibia</i>					1	I (1)
<i>Salix cinerea</i> (seedling)					1	I (1)
<i>Rumex conglomeratus</i>					1	I (1)

- 5.4.187 Also present in the east of this swamp, is a small stand reed canary-grass vegetation community (Table 64) on the drier periphery of the bulrush stand. This is S28 *Phalaris arundinacea* tall-herb fen, *Epilobium hirsutum*-*Urtica dioica* sub-community, also a widespread and common community.

Table 64: NVC frequency table for drier swamp community within settlement bed at Coleshill Sewage Works

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Phalaris arundinacea</i>					9	I (10)
<i>Epilobium hirsutum</i>					4	I (4)
<i>Solanum dulcamara</i>					2	I (2)
<i>Typha latifolia</i>					2	I (2)
<i>Epilobium ciliatum</i>					1	I (2)

- 5.4.188 There is a small stand of willow scrub within the largest settlement bed that is dominated by grey willow and white willow with a low cover of osier (*Salix viminalis*) and elder. This woodland forms a dense low thicket and has developed on the drier margin of the swamp. The ground flora is dominated by common nettle. This scrub community (Table 65) is also closest to W1 *Salix cinerea-Galium palustre* woodland but is likely to be in transition to W6 *Alnus glutinosa-Urtica dioica* woodland. The high nutrient conditions makes this community atypical and it does not reliably meet any NVC description. Analysis with MATCH returned very low coefficients of similarity with the highest being 10.2% for W6. Both these communities are widespread but local on damp soils in the British lowlands.

Table 65: NVC frequency table for willow scrub within settlement bed at Coleshill Sewage Works

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Salix alba</i>					7	I (7)
<i>Salix cinerea</i>					6	I (6)
<i>Sambucus nigra</i>					2	I (2)
<i>Salix caprea</i>					1	I (1)
<i>Salix viminalis</i>					1	I (1)
<i>Urtica dioica</i>					10	I (10)

Coleshill Sewage Works West (030-PH2-164005) – vegetation communities

- 5.4.189 In the west of the site, there is a grassland community on the paths between the settlement beds, which is grazed by rabbits. Common nettle is absent from this community. Although still relatively species-poor, it contains red fescue and a more diverse assemblage of herbaceous species including perforate St-John's-wort and ribwort plantain (*Plantago lanceolata*). This grassland community (Table 66) is a form of MG1a *Arrhenatherum elatius* grassland, *Festuca rubra* sub-community, a ubiquitous community of neglected grasslands and verges.

Table 66: NVC frequent table for coarse grassland community found between settlement beds in west of Coleshill Sewage Works

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Festuca rubra</i>					8	I (8)
<i>Poa trivialis</i>					8	I (8)
<i>Chamerion angustifolium</i>					6	I (6)
<i>Elytrigia repens</i>					6	I (6)
<i>Urtica dioica</i>					6	I (6)
<i>Galium aparine</i>					4	I (4)
<i>Vicia tetrasperma</i>					4	I (4)
<i>Agrostis capillaris</i>					3	I (3)
<i>Arrhenatherum elatius</i>					3	I (3)
<i>Achillea millefolium</i>					2	I (2)
<i>Conium maculatum</i>					2	I (2)
<i>Crepis capillaris</i>					2	I (2)
<i>Holcus lanatus</i>					2	I (2)
<i>Senecio jacobaea</i>					2	I (2)
<i>Sonchus asper</i>					2	I (2)
<i>Carduus crispus</i>					1	I (1)
<i>Dactylis glomerata</i>					1	I (1)
<i>Epilobium ciliatum</i>					1	I (1)
<i>Geranium dissectum</i>					1	I (1)
<i>Heracleum sphondylium</i>					1	I (1)

5.4.190 Within the interior of the western settlement beds there are slight depressions or areas of impeded drainage with a vegetation community characterised by rosebay willowherb although this species is not dominant in the sward. Rough meadow-grass is dominant, whilst cleavers, common nettle and amphibious bistort are also present. There is also local abundance of Yorkshire fog, cock's foot, red fescue and common couch. This vegetation community (Table 67) closely resembles the open vegetation community OV27b *Chamerion angustifolium-Urtica dioica-Cirsium arvense* sub-community (MATCH gave a coefficient of similarity of 45%), a widespread and common community.

Table 67: NVC frequency table for ruderal grassland community within disused settlement beds at Coleshill Sewage Works

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Poa trivialis</i>				10	10	II (10)
<i>Chamerion angustifolium</i>				2	4	II (2-4)

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Persicaria amphibia</i>				4	1	II (1-4)
<i>Galium aparine</i>				2	1	II (1-2)
<i>Urtica dioica</i>				-	4	I (4)
<i>Poa annua</i>				3	-	I (3)
<i>Sambucus nigra</i>				-	2	I (2)
<i>Epilobium ciliatum</i>				1	-	I (1)
<i>Holcus lanatus</i>				-	1	I (1)

- 5.4.191 Within one settlement bed in the west of the site there is a damp depression that is likely to be periodically inundated with shallow water during rainfall, which may remain over the winter. The grassy vegetation present is typical of these conditions. The depression is flanked by low growth of reed canary-grass community that is forming into a stand of the S28 *Phalaris arundinacea* tall-herb fen. The open damper areas have abundant pointed spear-moss (*Calliergonella cuspidata*), often under water, fringed with creeping bent (*Agrostis stolonifera*). Soft rush, celery-leaved buttercup, creeping yellow-cress (*Rorippa sylvestris*) and amphibious bistort are occasional. This vegetation community (Table 68) does not reliably fit with the NVC and is likely to be influenced by the unnaturally high nutrient conditions, but is closest to OV28a *Agrostis stolonifera*-*Ranunculus repens* community, *Polygonum hydropiper*-*Rorippa sylvestris* sub-community (MATCH gave a relatively low coefficient of similarity of 30%), which occurs widely on suitable substrates throughout the British lowlands.

Table 68: NVC frequency table for inundation community within settlement bed at Coleshill Sewage Works

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Agrostis stolonifera</i>					7	I (7)
<i>Calliergonella cuspidata</i>					6	I (6)
<i>Phalaris arundinacea</i>					5	I (5)
<i>Rorippa sylvestris</i>					2	I (2)
<i>Ranunculus sceleratus</i>					2	I (2)
<i>Persicaria amphibia</i>					1	I (1)
<i>Juncus effusus</i>					1	I (1)

Curdworth Bridge Meadow North (030-PH2-164002)

Site description and reasons for selection for survey

- 5.4.192 Curdworth Bridge Meadow is to the west of Coleshill Sewage Works and lies north of the River Tame. It is surrounded by 2m high bunds and is within the River Tame flood plain. This site was selected for survey as it was identified as potentially unidentified lowland meadow, a habitat of principal importance. This site includes a mosaic of wet grassland depressions and drier areas of taller coarse grassland with scattered scrub.

Vegetation communities present

- 5.4.193 The wet grassland depressions are dominated by rough meadow-grass and common bent (*Agrostis capillaris*), which are locally dominant. Yorkshire fog, red fescue and hairy sedge (*Carex hirta*) are frequent, and tufted hair-grass is scattered throughout the sward, but not dominant. The dry grassland has abundant false oat-grass. Also present are common sorrel (*Rumex acetosa*), meadow buttercup (*Ranunculus acris*), amphibious bistort and great burnet.
- 5.4.194 Despite the presence of great burnet, normally associated with MG4 *Alopecurus pratensis*-*Sanguisorba officinalis* grassland, which is a declining community found on unimproved flood plain meadows, the grassland community (Table 6g) at this site most closely resembles MGgb *Holcus lanatus*-*Deschampsia cespitosa* grassland, *Arrhenatherum elatius* sub-community (MATCH coefficient of similarity of 39%) typical of lowland periodically inundated neutral soils and common throughout Britain. In the drier areas the community grades to MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community, a common community of grasslands with high nutrient input. The bunds have abundant common nettle, which forms the OV24b *Urtica dioica*-*Galium aparine* community, *Arrhenatherum elatius*-*Rubus fruticosus* agg. sub-community.

Table 6g: NVC frequency table for coarse grassland community at Curdworth Bridge Meadow

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Agrostis capillaris</i>	10	10	7	6	8	V (6-10)
<i>Festuca rubra</i>	4	4	9	8	6	V (4-9)
<i>Holcus lanatus</i>	-	-	7	7	3	III (3-7)
<i>Carex hirta</i>	-	4	4	-	6	III (4-6)
<i>Ranunculus acris</i>	-	-	2	2	2	III (2)
<i>Persicaria amphibia</i>	6	6	-	-	-	II (6)
<i>Sanguisorba officinalis</i>	-	-	1	5	-	II (1-5)
<i>Achillea millefolium</i>	-	-	-	4	1	II (1-4)
<i>Rumex acetosa</i>	-	-	-	3	2	II (2-3)
<i>Deschampsia cespitosa</i>	-	-	-	-	7	I (7)
<i>Galium verum</i>	-	-	-	4	-	I (4)
<i>Cerastium fontanum</i>	-	-	1	-	-	I (1)
<i>Cirsium arvensis</i>	-	-	-	1	-	I (1)
<i>Heracleum sphondylium</i>	-	-	1	-	-	I (1)

Hams Hall Woodlands (part of Hams Hall Woodlands LWS)

Site description and reasons for selection for survey

- 5.4.195 Hams Hall Woodlands cover an area of approx 2.5ha divided in half by the existing Kingsbury to Water Orton rail line. The adjacent land is industrial to the east, south

and west and the woodland complex continues to the north, including an area of ancient woodland. Hams Hall Woodlands are not Ancient Woodlands but are secondary, neglected coppice with mature standard trees.

- 5.4.196 To the north of the existing railway an approximately 50m wide strip is managed to restrict the growth of trees under electricity pylons. In this area dense bracken has established, which is likely to hinder tree colonisation. The area is undulating and there are localised damper patches within the woodland. South of the existing Kingsbury to Water Orton rail line more pylons cross the site, and there has been significant clearance and disturbance, which has left a mosaic of habitats, including woodland, young trees, scrub and tall ruderal vegetation. The areas adjacent to the Hams Lane and the Kingsbury to Water Orton rail line are dominated by scrub and woodland is present in the eastern corner of the site.

Hams Hall Woodland South (030-PH2-165007) – vegetation communities

- 5.4.197 South of the existing Kingsbury to Water Orton rail line, clearance of woodland has apparently been undertaken for the railway line, electricity pylons and a sub-station. This has resulted in a scrub community dominated by bramble, with abundant wood sage (*Teucrium scorodonia*) and common nettle. This scrub community (Table 70) is W24a *Rubus fruticosus*-*Holcus lanatus* underscrub, *Cirsium arvense*-*Cirsium vulgare* sub-community (MATCH coefficient of similarity of 42%), which is common and widespread on woodland edges and in neglected fields in lowland Britain.

Table 70: NVC frequency table for bramble scrub community at Hams Hall Woodlands south of the existing Kingsbury to Water Orton rail line

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Rubus fruticosus</i> agg.				9	10	II (9-10)
<i>Urtica dioica</i>				6	2	II (2-6)
<i>Cirsium arvense</i>				4	1	II (1-4)
<i>Holcus lanatus</i>				3	2	II (2-3)
<i>Teucrium scorodonia</i>				2	2	II (2)
<i>Potentilla reptans</i>				-	5	I (5)
<i>Galium aparine</i>				4	-	I (4)
<i>Glechoma hederacea</i>				-	4	I (4)
<i>Digitalis purpurea</i>				3	-	I (3)
<i>Dryopteris filix-mas</i>				-	3	I (3)
<i>Galeopsis tetrahit</i>				2	-	I (2)
<i>Lamium album</i>				2	-	I (2)
<i>Lotus pedunculatus</i>				-	2	I (2)
<i>Prunella vulgaris</i>				-	2	I (2)
<i>Rosa canina</i>				-	2	I (2)
<i>Cirsium vulgare</i>				1	-	I (1)

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Hyacinthoides non-scripta</i>				-	1	I (1)

- 5.4.198 Alongside the railway line are stands of rosebay willowherb, with common nettle and creeping thistle. This vegetation community (Table 71) is OV27b *Chamerion angustifolium* community, *Urtica dioica*-*Cirsium arvense* sub-community (MATCH coefficient of similarity of 38%).

Table 71: NVC frequency table for rosebay willowherb community at Hams Hall Woodlands south of the existing Kingsbury to Water Orton rail line

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Rubus fruticosus</i> agg.				10	10	II (10)
<i>Teucrium scorodonia</i>				5	3	II (3-5)
<i>Chamerion angustifolium</i>				2	3	II (2-3)
<i>Hypericum perforatum</i>				3	2	II (2-3)
<i>Potentilla reptans</i>				2	3	II (2-3)
<i>Urtica dioica</i>				3	2	II (2-3)
<i>Holcus lanatus</i>				2	2	II (2)
<i>Cirsium arvense</i>				1	2	II (1-2)
<i>Malva moschata</i>				-	4	I (4)
<i>Centaurea erythraea</i>				3	-	I (3)
<i>Lotus pedunculatus</i>				-	2	I (2)
<i>Prunella vulgaris</i>				-	2	I (2)
<i>Cirsium vulgare</i>				-	1	I (1)
<i>Juncus inflexus</i>				1	-	I (1)
<i>Rumex crispus</i>				1	-	I (1)

- 5.4.199 The woodland community south of the existing railway covers a small area and has a canopy dominated by pedunculate oak and silver birch. Aspen is present, forming a stand of suckering trees, and there is coppice hazel and sweet chestnut, and ash. Elder is locally abundant in the shrub layer with hawthorn (and wild privet also recorded). Common nettle is locally abundant in the ground flora, which indicates higher nutrient content in the soil. Red campion, ground ivy and common feather-moss are frequent. This woodland community (Table 72) shows signs of disturbance and succession changes and appears to have affinities to scrub communities as well as woodland of high nutrient situations. It was determined by the field surveyors to most closely resemble a species-poor example of W10 *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, which is a very common woodland community of base-poor soils in the British lowlands.

Table 72: NVC frequency table for woodland at Hams Hall Woodlands south of the existing Kingsbury to Water Orton rail line

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Fraxinus excelsior</i>				5	-	I (5)
<i>Quercus robur</i>				5	-	I (5)
<i>Betula pendula</i>				4	-	I (4)
<i>Castanea sativa</i>				1	-	I (1)
<i>Pinus sylvestris</i>				1	-	I (1)
<i>Sambucus nigra</i>				1	3	II (1-3)
<i>Ligustrum vulgaris</i>				5	-	I (5)
<i>Crataegus monogyna</i>				4	-	I (4)
<i>Populus tremula</i> (sucker)				3	-	I (3)
<i>Corylus avellana</i>				2	-	I (2)
<i>Urtica dioica</i>				10	9	II (9-10)
<i>Kindbergia praelonga</i>				4	10	II (4-10)
<i>Silene dioica</i>				6	7	II (6-7)
<i>Glechoma hederacea</i>				3	4	II (3-4)
<i>Digitalis purpurea</i>				-	3	I (3)
<i>Galium aparine</i>				2	2	II (2)
<i>Dryopteris filix-mas</i>				-	6	I (6)
<i>Hedera helix</i>				2	-	I (2)

Hams Hall Woodland North (030-PH2-165008) Vegetation communities

- 5.4.200 In the woodland north of the existing Kingsbury to Water Orton rail line, there is a canopy of pedunculate oak standards with tall coppice of silver birch and sweet chestnut. There are stands of younger oak and occasional coppiced hazel and mature holly in the shrub layer. The ground flora is variable due to differing light and hydrological conditions. Bramble, wood sage and red campion are frequent; and bracken, honeysuckle and bluebell are locally abundant especially in the northern part of the woodland. This woodland community (Table 73) is W10 *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, *Holcus lanatus* sub-community (MATCH coefficient of similarity of 46%).
- 5.4.201 In the more open areas of cleared woodland, tree species are only present as saplings or young trees. In these areas the ground flora is dominated by either bramble or bracken, with common nettle locally abundant. Here there is the vegetation community W25 *Pteridium aquilinum*-*Rubus fruticosus* underscrub, which is widespread on suitable soils throughout Britain.

Table 73: NVC frequency table for Hams Hall Woodlands north of the existing Kingsbury to Water Orton rail line

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	-	3	5	9	8	IV (3-9)
<i>Betula pendula</i>	5	3	-	4	3	IV (3-5)
<i>Castanea sativa</i>	-	7	8	-	-	II (7-8)
<i>Betula pubescens</i>	6	-	-	-	-	I (6)
<i>Corylus avellana</i>	1	-	1	-	3	III (1-3)
<i>Ilex aquifolium</i>	3	-	3	-	-	II (3)
<i>Sambucus nigra</i>	-	3	-	-	-	I (3)
<i>Salix cinerea</i> (sapling)	3	-	-	-	-	I (3)
<i>Rhododendron ponticum</i>	-	-	-	-	1	I (1)
<i>Rubus fruticosus</i> agg.	2	3	8	-	5	IV (2-8)
<i>Urtica dioica</i>	3	6	4	-	-	III (3-6)
<i>Teucrium scorodonia</i>	4	5	-	-	2	III (2-5)
<i>Pteridium aquilinum</i>	-	-	-	8	8	II (8)
<i>Mnium hornum</i>	4	-	-	-	-	II (4-8)
<i>Epilobium hirsutum</i>	5	3	-	-	-	II (3-5)
<i>Agrostis capillaris</i>	4	4	-	-	-	II (4)
<i>Digitalis purpurea</i>	2	4	-	-	-	II (2-4)
<i>Glechoma hederacea</i>	4	2	-	-	-	II (2-4)
<i>Silene dioica</i>	4	3	-	2	-	II (2-4)
<i>Juncus effusus</i>	1	-	-	4	-	II (1-4)
<i>Stachys sylvatica</i>	3	2	-	-	-	II (2-3)
<i>Hyacinthoides non-scripta</i>	-	-	3	-	1	II (1-3)
<i>Lonicera periclymenum</i>	-	-	-	7	-	I (7)
<i>Brachypodium sylvaticum</i>	-	-	-	5	-	I (5)
<i>Cirsium vulgare</i>	4	-	-	-	-	I (4)
<i>Kindbergia praelonga</i>	4	-	-	-	-	I (4)
<i>Cirsium arvense</i>	-	-	3	-	-	I (3)
<i>Scrophularia auriculata</i>	3	-	-	-	-	I (3)

Birmingham and Fazeley Canal (030-PH2-167001)

Site description and reasons for selection for survey

5.4.202 The Birmingham and Fazeley Canal is recognised as a potential Local Wildlife Site by North Warwickshire Borough Council. The habitat includes eutrophic standing open

Water, which is a habitat of principal importance. The survey site included a stretch of the Birmingham and Fazeley Canal to the north-east of Curdworth on North Warwickshire. The survey site included the stretch of canal from Dunton Wharf Bridge to a point between White Bridge and Marston Field Bridge.

- 5.4.203 The canal in this stretch has a towpath on the eastern side that is alongside a canal bank with low vegetation kept low by mowing. This bank of the canal is partly supported by concrete and brick reinforcements, close to the locks and bridges for protection against mooring boats. The towpath is separated from neighbouring arable land and pasture by a hedgerow. The western bank of the canal has more natural vegetation, which is in places shaded by a strip of scrub, and in places more open with tall ruderal vegetation. Beyond this strip are arable fields. The eastern bank of the canal alongside the towpath is very sparsely vegetated. Only a low disturbed grass community is present on the banks.

Vegetation communities present

- 5.4.204 On the western side there are stands of grey willow scrub, but these are too small to form a true scrub community. Between Marston Lane Bridge and the lock to the north of the bridge there are stands of emergent vegetation on the western edge of the canal. The largest vegetation community (Table 74) is S5b *Glyceria maxima* swamp, *Alisma plantago aquatica*-*Sparganium erectum* sub-community, which is dominated by reed sweet-grass that extends from the bank out into the canal forming a floating 'raft' of shoots. This community is found mainly in the centre, south and east of Britain, on suitable watercourse margins. Close to the bank, hemlock water-dropwort, wild angelica, gypsywort and skullcap (*Scutellaria galericulata*) are present, and amongst the raft of reed sweet-grass, great yellow-cress, and bittersweet are growing.

Table 74: NVC frequency table for reed sweet-grass dominated swamp community on the Birmingham and Fazeley Canal

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Glyceria maxima</i>	10	10	9	8	10	V (8-10)
<i>Rorippa amphibian</i>	4	1	4	-	-	III (1-4)
<i>Sparganium erectum</i>	4	-	-	5	-	II (4-5)
<i>Oenanthe crocata</i>	1	-	-	-	2	II (1-2)
<i>Solanum dulcamara</i>	2	-	-	-	-	I (2)
<i>Angelica sylvestris</i>	1	-	-	-	-	I (1)
<i>Lycopus europaeus</i>	1	-	-	-	-	I (1)
<i>Scutellaria galericulata</i>	1	-	-	-	-	I (1)

- 5.4.205 Branched bur-reed also occurs on the edge of the stand S5b *Glyceria maxima* swamp, *Alisma plantago aquatica*-*Sparganium erectum* sub-community grading into the vegetation community (Table 75) S14a *Sparganium erectum* swamp, *Sparganium erectum* sub-community, which is very common throughout the lowlands of Britain. Only yellow iris occurs alongside this species at this location.

Table 75: NVC frequency table for branched bur-reed dominated swamp community on the Birmingham and Fazeley Canal

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Sparganium erectum</i>					9	I (9)
<i>Iris pseudacorus</i>					1	I (1)

- 5.4.206 Close to Marston Lane, also on the western side a small stand of sedge-dominated vegetation occurs. This vegetation community (Table 76) is S7 *Carex acutiformis* swamp, and lesser pond-sedge occurs with reed sweet-grass and branched bur-reed in the deeper water. This community occurs locally in lowland Britain, although large stands are uncommon. Gypsywort, hemlock water-dropwort and hedge bindweed (*Calystegia sepium*) are associated plants that are growing on the bank.

Table 76: NVC frequency table for sedge community on the Birmingham and Fazeley Canal

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Carex acutiformis</i>					6	I (6)
<i>Oenanthe crocata</i>					5	I (5)
<i>Glyceria maxima</i>					4	I (4)
<i>Calystegia sepium</i>					2	I (2)
<i>Lycopus europaeus</i>					2	I (2)
<i>Sparganium erectum</i>					2	I (2)

- 5.4.207 One or two plants of fennel pondweed (*Potamogeton pectinatus*) were found, suggesting that the aquatic A12 *Potamogeton pectinatus* community is present, which is common in inland waterways. However, the disturbance caused by boats may prevent extensive growth of aquatic plants within the canal.

Cuttle Mill Fishery Plantation (030-PH2-168001)

Site description and reasons for selection for survey

- 5.4.208 This site includes a stand of woodland that is present around three ponds, which are former mill pools for Cuttle Mill, which once operated on the site. The mill buildings and ponds are now run as a coarse fishery. The site is recognised as a potential LWS in Warwickshire. The site is surrounded by arable fields.
- 5.4.209 South-west of the ponds is the largest stand of woodland, formerly known as Mill Plantation. This is lowland mixed deciduous woodland, a Habitat of Principal Importance. There is a remnant piece of woodland to the east of the ponds, formerly known as Lower Mill Plantation that was once larger in size. This is present on OS maps as recent as the 1980s but has since been partly grubbed out for arable, and a third pond has been dug within it.
- 5.4.210 The landscape is low-lying and flat, and there are numerous ponds and lakes in the locality. As well as at Cuttle Mill, there are nearby ponds within 1km to the west (at The Belfry golf course), to the north, and to the south-east of the site. The underlying geology is Mercia Mudstone with superficial deposits of Alluvium. The soil is

seasonally waterlogged, slowly permeable, and slightly acidic. There may be fertiliser run-off from the surrounding fields leading to eutrophication of the ponds and ground water.

- 5.4.211 This woodland is not listed as ancient woodland on the Natural England inventory and the old woodland names of Mill Plantation and Lower Mill Plantation suggest that they are of planted origin.

Vegetation communities present

- 5.4.212 Mill Plantation is woodland with a canopy of mixed ash, sycamore and alder. Aspen and crack willow are locally frequent, but pedunculate oak is only occasional in the canopy. There is a very pronounced shrub layer, which includes hazel, hawthorn, rhododendron, holly, elder and rowan. Ivy is abundant and honeysuckle frequent in this layer, climbing amongst the shrubs. In the field layer, ivy is also locally abundant, as is common nettle. Bluebell is frequent throughout and locally abundant. Other frequently recorded species include cleavers, red campion, bramble and lords-and-ladies. Ancient woodland indicator species were not recorded in high numbers, either species richness or abundance but nine species were recorded, which included bluebell, wych elm, holly, red currant, moschatel (*Adoxa moschatellina*), aspen, black bryony, pignut and wood millet. This woodland community (Table 77) is closest to W8e *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Geranium robertianum* sub-community (with a MATCH coefficient of similarity of 44%), which is generally associated with more western and northern woodlands. Due to the high frequency of alder in the canopy, it shares some features with the wet woodland community of eutrophic flood-plain mires W6 *Alnus glutinosa*-*Urtica dioica* woodland, but the samples taken are a relatively poor fit to this community type. There is no indication from the information available on geology and soils that the site is permanently waterlogged, although a high water table or poor drainage was detected during the survey (hollows left by fallen tree root plates had filled with water, and the soil depth was recorded as approximately 500mm). The site is on alluvial deposits from the upper reaches of a former river catchment.

Table 77: NVC frequency table for woodland at Cuttle Mill Fishery

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Fraxinus excelsior</i>	7	5	4	8	6	V (5-8)
<i>Acer pseudoplatanus</i>	4	2	6	1	1	V (1-6)
<i>Alnus glutinosa</i>	4	4	4	4	1	V (1-4)
<i>Quercus robur</i>	1	1	1	-	1	IV (1)
<i>Salix fragilis</i>	1	-	-	5	6	III (1-6)
<i>Populus alba</i>	-	1	1	-	1	III (1)
<i>Populus tremula</i>	1	5	-	-	-	II (2-5)
<i>Prunus spinosa</i>	-	2	-	-	-	I (2)
<i>Aesculus hippocastanum</i>	-	-	1	-	-	I (1)
<i>Ilex aquifolium</i>	-	-	-	-	1	I (1)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Hedera helix</i>	8	9	9	9	4	V (4-9)
<i>Ulmus glabra</i>	1	1	1	1	2	V (1-2)
<i>Rhododendron ponticum</i>	5	1	1	1	-	IV (1-4)
<i>Corylus avellana</i>	1	1	2	2	-	IV (1-2)
<i>Crataegus monogyna</i>	1	1	2	2	-	IV (1-2)
<i>Ilex aquifolium</i>	1	-	1	2	1	IV (1-2)
<i>Lonicera periclymenum</i>	2	1	1	-	2	IV (1-2)
<i>Sambucus nigra</i>	1	2	2	2	-	IV (1-2)
<i>Sorbus aucuparia</i>	1	1	-	1	1	IV (1)
<i>Betula pubescens</i>	1	-	-	4	6	III (1-6)
<i>Prunus avium</i>	1	1	1	-	-	III (1)
<i>Acer pseudoplatanus</i>	-	2	-	-	-	I (2)
<i>Fraxinus excelsior</i>	-	2	-	-	-	I (2)
<i>Urtica dioica</i>	7	8	2	2	9	V (2-9)
<i>Hyacinthoides non-scripta</i>	2	2	7	4	4	V (2-7)
<i>Galium aparine</i>	1	3	1	3	6	V (1-6)
<i>Silene dioica</i>	1	1	1	2	6	V (1-6)
<i>Arum maculatum</i>	1	1	1	1	1	V (1)
<i>Rubus fruticosus</i> agg.	2	-	1	2	4	IV (1-4)
<i>Ribes rubrum</i>	2	5	2	-	-	III (2-5)
<i>Circaea lutetiana</i>	4	4	2	-	-	III (2-4)
<i>Dryopteris dilatata</i>	1	1	2	-	-	III (1-2)
<i>Geranium robertianum</i>	2	-	2	1	-	III (1-2)
<i>Angelica sylvestris</i>	1	1	1	-	-	III (1)
<i>Cardamine flexuosa</i>	-	-	2	-	2	II (2)
<i>Mnium hornum</i>	2	-	-	2	-	II (2)
<i>Populus tremula</i>	1	2	-	-	-	II (1-2)
<i>Tamus communis</i>	-	-	-	1	1	II (1)
<i>Kindbergia praelonga</i>	3	-	-	-	-	I (3)
<i>Fraxinus excelsior</i>	-	-	2	-	-	I (2)
<i>Rumex sanguineus</i>	-	-	-	-	2	I (2)
<i>Acer pseudoplatanus</i>	-	-	1	-	-	I (1)
<i>Adoxa moschatellina</i>	-	-	1	-	-	I (1)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Anthriscus sylvestris</i>	-	-	-	-	1	I (1)
<i>Brachypodium sylvaticum</i>	-	-	-	-	1	I (1)
<i>Cirsium arvense</i>	-	-	-	-	1	I (1)
<i>Conopodium majus</i>	-	-	-	1	-	I (1)
<i>Dryopteris filix-mas</i>	-	-	-	-	1	I (1)
<i>Alliaria petiolata</i>	-	-	-	1	-	I (1)
<i>Geum urbanum</i>	-	-	-	-	1	I (1)
<i>Hieracium</i> sp.	-	-	-	-	1	I (1)
<i>Iris pseudacorus</i>	-	1	-	-	-	I (1)
<i>Milium effusum</i>	1	-	-	-	-	I (1)
<i>Quercus robur</i>	-	1	-	-	-	I (1)
<i>Rosa arvensis</i>	-	-	-	-	1	I (1)
<i>Rumex obtusifolius</i>	-	-	-	-	1	I (1)
<i>Stachys sylvatica</i>	-	-	-	-	1	I (1)

Langley Brook (030-PH2-171004)

Site description and reasons for selection for survey

- 5.4.213 Langley Brook is a potential LWS in Warwickshire and is a habitat of principal importance under the rivers classification.

Vegetation communities present

- 5.4.214 Langley Brook is a fast flowing stream with gravel bed and locally dominant patches of river water-crowfoot. Reed sweet-grass has developed on raised silty berms and branched bur-reed is present in deeper water.
- 5.4.215 The riverbanks are shaded with overhanging mature alder and crack willow, with a dense common nettle understorey and Indian balsam with occasional wild garlic and dog's mercury. The riverbank is dominated by the woodland community (Table 78) W6 *Alnus glutinosa*-*Urtica dioica* woodland (with a relatively low MATCH coefficient of 34%), a widespread but local community in lowland Britain.

Table 78: NVC frequency table for riverbank vegetation community at Langley Brook

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Salix fragilis</i>				6	6	II (6)
<i>Quercus robur</i>				5	5	II (5)
<i>Crataegus monogyna</i>				4	4	II (4)
<i>Impatiens glandulifera</i>				9	10	II (9-10)
<i>Urtica dioica</i>				4	3	II (3-4)

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Allium ursinum</i>				2	3	II (2-3)
<i>Galium aparine</i>				4	0	I (4)
<i>Ranunculus ficaria</i>				0	2	I (2)
<i>Heracleum sphondylium</i>				0	1	I (1)
<i>Veronica hederifolia</i>				1	0	I (1)

Walker's Spinney (030-PH2-171003)

Site description and reasons for selection for survey

- 5.4.216 Walker's Spinney is secondary deciduous woodland of 1.2ha in size located to the east of Middleton in Warwickshire. It is not classified as ancient woodland on the Natural England inventory but is recognised as lowland mixed deciduous woodland, a Habitat of Principal Importance. The woodland has a canopy of semi-mature trees with occasional mature trees. The shrub layer is sparse (30% cover). The ground flora is well-developed covering 85% of the woodland floor.
- 5.4.217 There is a dry ditch running north south along the middle of the woodland, which branches at the southern end and outflows to Langley Brook. There is also a dry ditch running along the western edge of the woodland. Signs of inundation from Langley Brook were evident in the south of the wood, which influences the ground flora composition of this woodland.

Vegetation communities present

- 5.4.218 The dominant canopy species is self-sown sycamore and alder, with standard mature pedunculate oak, occasional ash, beech, rowan and hazel. The shrub layer consists of dominant elder, hawthorn and bramble, with guelder rose also present at low abundance.
- 5.4.219 The ground flora species include a number of ancient woodland indicator species including constant bluebell and locally abundant wild garlic, moschatel and occasional pignut and wood millet. Dog's mercury, common nettle, cleavers and broad-buckler-fern are also frequent.
- 5.4.220 The woodland is formed of a mosaic of wet and dry woodland communities (Table 79), with a diverse ground flora in the wetter areas. The wet woodland is W6 *Alnus glutinosa-Urtica dioica* woodland (MATCH coefficients of similarity of 45%), which is present in the north and around the ditches. The drier woodland community W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland (MATCH coefficients of 46%) is present towards the south of the site, where bluebell and bramble are dominant.

Table 79: NVC frequency table for Walker's Spinney

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Acer pseudoplatanus</i>	8	7	8	6	8	V (6-8)
<i>Quercus robur</i>	3	8	-	-	-	II (3-8)
<i>Salix fragilis</i>	-	-	7	-	-	I (7)
<i>Betula pendula</i>	-	-	-	-	2	I (2)
<i>Fraxinus excelsior</i>	1	-	-	-	-	I (1)
<i>Sambucus nigra</i>	5	-	8	4	5	IV (4-8)
<i>Crataegus monogyna</i>	5	5	-	-	1	III (1-5)
<i>Corylus avellana</i>	3	-	-	-	-	I (3)
<i>Sorbus aucuparia</i>	-	1	-	-	-	I (1)
<i>Hyacinthoides non-scripta</i>	2	8	4	9	3	V (2-9)
<i>Rubus fruticosus</i> agg.	3	6	1	5	5	V (1-6)
<i>Dryopteris dilatata</i>	2	2	2	1	-	IV (1-2)
<i>Urtica dioica</i>	4	-	4	-	5	III (4-5)
<i>Galium aparine</i>	3	-	3	-	3	III (3)
<i>Impatiens glandulifera</i>	1	-	1	-	2	III (1-2)
<i>Silene dioica</i>	3	-	3	-	3	III (3)
<i>Allium ursinum</i>	9	-	-	-	1	II (1-9)
<i>Ilex aquifolium</i>	-	7	-	-	4	II (4-7)
<i>Brachythecium rutabulum</i>	4	2	-	-	-	II (2-4)
<i>Milium effusum</i>	-	-	-	4	2	II (2-4)
<i>Stachys sylvatica</i>	3	-	-	-	3	II (3)
<i>Arum maculatum</i>	-	-	3	2	-	II (2)
<i>Stellaria media</i>	2	-	-	-	2	II (2)
<i>Viburnum opulus</i>	2	-	-	-	-	I (2)
<i>Hedera helix</i>	-	-	6	-	-	I (6)
<i>Adoxa moschatellina</i>	-	-	5	-	-	I (5)
<i>Mercurialis perennis</i>	-	-	5	-	-	I (5)
<i>Mnium hornum</i>	4	-	-	-	-	I (4)
<i>Ranunculus ficaria</i>	-	-	4	-	-	I (4)
<i>Veronica hederifolia</i>	2	-	-	-	-	I (2)
<i>Deschampsia cespitosa</i>	-	-	-	-	1	I (1)
<i>Dryopteris filix-mas</i>	-	-	-	1	-	I (1)

Park Gate Farm Pond (030-PH2-171002)

- 5.4.221 This pond is a man-made reservoir of recent origin within a field to the east of Walker's Spinney. It was selected for survey as it was identified as a potential habitat of principal importance, and a brief walkover survey of the site was undertaken. The pond margins have scattered rushes, but a diverse assemblage of emergent wetland plants is absent. Due to this reservoir being of recent origin and species-poor, it was not considered to be habitat of principal importance and a full NVC survey was not undertaken.

Middleton Pool SSSI (030-PH2-171001)

Site description and reasons for selection for survey

- 5.4.222 Middleton Pool is a Site of Special Scientific Interest that adjoins Middleton Hall in North Warwickshire. Middleton Pool contains a large excavated lake fed by Langley Brook and is surrounded by a high diversity of vegetation communities including aquatic swamp, tall herb fen, neutral grassland and wet woodland.
- 5.4.223 Middleton Pool covers an area of 12.6ha but the NVC survey area only covers approximately 9ha of this site, which excludes the eastern half of the lake. The woodland present on site is not classified as ancient woodland on the Natural England inventory but is lowland mixed deciduous woodland, a Habitat of Principal Importance.
- 5.4.224 Wet woodland covers an area of approximately 2ha at the southwest corner of the lake, and there is a drier woodland strip along the south and west edge of the site. Swamp habitat covers the low-lying area at the northwest and southwest edge of Middleton Pool. This habitat covers a 20m wide strip around the lake margin.

Vegetation communities present

- 5.4.225 The wet woodland is dominated by crack willow, with frequent goat willow and alder. The shrub layer is sparse and comprises of elder and sprawling bittersweet, and the ground flora is composed of bittersweet, reed sweet-grass, marsh bedstraw and gypsywort indicative of wet ground conditions. There are large expanses of bare mud between these herbs and common nettle is present in small quantities in drier open areas.
- 5.4.226 This wet woodland community (Table 8o) is W6b *Alnus glutinosa-Urtica dioica* woodland, *Salix fragilis* sub-community (with a low MATCH coefficient of similarity of 38%). Despite the low MATCH coefficient, the surveyor identified the W6b community from field observations due to the overall dominance of crack willow in the community.

Table 8o: NVC frequency table for wet woodland at Middleton Pool SSSI

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Salix fragilis</i>	10	10	4	4	10	V (4-10)
<i>Alnus glutinosa</i>	-	-	4	-	4	II (4)
<i>Fraxinus excelsior</i>	-	-	-	1	-	I (1)
<i>Sambucus nigra</i>	2	-	2	-	1	III (1-2)
<i>Salix caprea</i>	-	-	7	9	-	II (7-9)
<i>Glyceria maxima</i>	3	7	-	-	8	III (3-8)
<i>Lycopus europaeus</i>	-	2	2	3	-	III (2-3)
<i>Mentha aquatica</i>	-	-	-	4	6	II (4-6)
<i>Carex riparia</i>	-	-	3	3	-	II (3)
<i>Ranunculus sceleratus</i>	3	2	-	-	-	II (2-3)
<i>Solanum dulcamara</i>	2	1	3	3	3	II (2-3)
<i>Urtica dioica</i>	2	-	-	-	3	II (2-3)
<i>Callitriche stagnalis</i>	-	2	-	-	2	II (2)
<i>Galium palustre</i>	2	-	-	-	2	II (2)
<i>Stellaria palustris</i>	1	2	-	-	-	II (1-2)
<i>Juncus</i> sp.	-	3	-	-	-	I (3)
<i>Phalaris arundinacea</i>	-	2	-	-	-	I (2)
<i>Rumex sanguineus</i>	2	-	-	-	-	I (2)
<i>Caltha palustris</i>	-	-	1	-	-	I (1)
<i>Myosotis scorpioides</i>	1	-	-	-	-	I (1)
<i>Rorippa sylvestris</i>	-	1	-	-	-	I (1)
<i>Veronica beccabunga</i>	1	-	-	-	-	I (1)

5.4.227 The woodland strip along the south and west edge of the site is a drier woodland community comprising alder and crack willow as the dominant components of the canopy but associated with occasional pedunculate oak, sessile oak (*Quercus petraea*) and hazel with a developed shrub layer of hawthorn, holly and bramble. The ground flora is diverse in these areas and includes dog's mercury, wild garlic, wood anemone, greater stitchwort (*Stellaria holostea*), pignut and bluebell. This woodland community (Table 81) is W6d *Alnus glutinosa-Urtica dioica* woodland, *Sambucus nigra* sub-community (with a relatively high MATCH coefficient of similarity of 48%).

Table 81: NVC frequency table for woodland on the edge of Middleton Pool SSSI

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Acer pseudoplatanus</i>	6	6	6	5	7	V (5-7)
<i>Salix fragilis</i>	1	-	6	7	7	IV (1-7)
<i>Quercus robur</i>	8	8	-	-	-	II (8)
<i>Quercus petraea</i>	4	-	-	-	-	I (4)
<i>Alnus glutinosa</i>	1	-	-	-	-	I (1)
<i>Crataegus monogyna</i>	-	2	5	4	4	IV (2-5)
<i>Corylus avellana</i>	5	-	1	-	-	II (1-5)
<i>Sambucus nigra</i>	1	-	1	-	-	II (1)
<i>Salix fragilis</i>	-	-	4	-	-	I (4)
<i>Ulmus procera</i> (sucker)	-	-	2	-	-	I (2)
<i>Urtica dioica</i>	4	3	4	4	5	V (3-5)
<i>Geum urbanum</i>	3	4	4	4	2	V (2-4)
<i>Hedera helix</i>	-	9	8	8	7	IV (7-9)
<i>Mercurialis perennis</i>	7	-	7	7	8	IV (7-8)
<i>Rubus fruticosus</i> agg.	-	8	4	4	5	IV (4-8)
<i>Geranium robertianum</i>	-	-	5	5	4	III (4-5)
<i>Allium ursinum</i>	-	-	-	5	5	II (5)
<i>Galium aparine</i>	-	-	4	-	4	II (4)
<i>Poa trivialis</i>	4	-	-	3	-	II (3-4)
<i>Silene dioica</i>	4	-	3	-	-	II (3-4)
<i>Hyacinthoides non-scripta</i>	-	8	-	-	-	I (8)
<i>Glechoma hederacea</i>	6	-	-	-	-	I (6)
<i>Ilex aquifolium</i>	-	-	-	-	4	I (4)
<i>Holcus mollis</i>	-	3	-	-	-	I (3)
<i>Stachys sylvatica</i>	-	-	-	-	2	I (2)
<i>Carex remota</i>	-	1	-	-	-	I (1)
<i>Dryopteris dilatata</i>	-	1	-	-	-	I (1)

- 5.4.228 The swamp to the south and west is dominated by a closed species-poor sward of reed sweet-grass with greater pond-sedge (*Carex riparia*) and lesser pond-sedge becoming dominant in some areas. Sweet flag (*Acorus calamus*), branched bur-reed, false fox sedge (*Carex otrubae*) and yellow iris are present at low cover values. This vegetation community is S5a *Glyceria maxima* swamp, *Glyceria maxima* sub-community (MATCH coefficient of similarity of 50%).

- 5.4.229 There is a thin 3m strip of species-poor swamp around the immediate edge of the lake that is dominated by bulrush and reed sweet-grass with occasional sweet flag, bittersweet and common marsh bedstraw. This vegetation community is S12a *Typha latifolia* swamp, *Typha latifolia* sub-community (MATCH coefficient of 55%).
- 5.4.230 The swamp community established around a drain in the south-west of the site is dominated by greater pond-sedge with frequent branched bur-reed. There is occasional water mint, bittersweet, gypsywort, bulrush and common marsh bedstraw. This community is S6 *Carex riparia* swamp, a community generally confined to the south and east of Britain.
- 5.4.231 In the north-west corner of the site is a large area of semi-improved grassland (2.3ha), in part dominated by false oat grass, cocksfoot and red fescue with a limited number of herbs, although pignut, meadow buttercup and common sorrel are frequent and field wood-rush (*Luzula campestre*) occasional. In lower-lying areas, meadow foxtail is more prominent, with Yorkshire fog and tufted hair grass. Meadow vetchling (*Lathyrus pratensis*) and cuckoo flower (*Cardamine pratensis*) are present here. This grassland (Table 82) is formed of a mosaic of the communities MG1a *Arrhenatherum elatius* grassland *Festuca rubra* sub-community and MG9b *Holcus lanatus*-*Deschampsia cespitosa* grassland, *Arrhenatherum elatius* sub-community. MATCH analysis of the sample set for this grassland gave a high coefficient of similarity of 48% for both sub-communities.

Table 82: NVC frequency table for grassland community at Middleton Pool SSSI

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Festuca rubra</i>	5	5	6	7	8	V (5-8)
<i>Arrhenatherum elatius</i>	5	8	4	3	4	V (3-8)
<i>Conopodium majus</i>	3	4	5	4	3	V (3-5)
<i>Poa pratensis</i>	5	4	4	2	4	V (2-5)
<i>Rumex acetosa</i>	2	2	2	4	3	V (2-4)
<i>Holcus lanatus</i>	-	2	4	5	4	IV (2-5)
<i>Veronica chamaedrys</i>	2	3	-	3	3	IV (2-3)
<i>Cirsium arvense</i>	2	2	2	-	2	IV (2)
<i>Dactylis glomerata</i>	5	4	-	-	4	III (4-5)
<i>Alopecurus pratensis</i>	-	-	7	4	-	II (4-7)
<i>Ranunculus acris</i>	1	-	-	4	-	II (1-4)
<i>Deschampsia cespitosa</i>	-	-	-	4	-	I (4)
<i>Lathyrus pratensis</i>	-	-	3	-	-	I (3)
<i>Cardamine pratensis</i>	-	-	-	2	-	I (2)
<i>Galium verum</i>	-	-	-	-	2	I (2)
<i>Luzula campestris</i>	-	-	-	-	2	I (2)
<i>Potentilla reptans</i>	-	2	-	-	-	I (2)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Stellaria graminea</i>	-	2	-	-	-	I (2)
<i>Cirsium palustre</i>	1	-	-	-	-	I (1)

- 5.4.232 Other communities present with the surveyed area of Middleton Pool SSSI include the ruderal community OV26d *Epilobium hirsutum* community, *Arrhenatherum elatius*-*Heracleum sphondylium* sub-community on dredged silt alongside a ditch from Langley Brook; and the floating aquatic communities and where white water-lily (A7 *Nymphaea alba* community) and yellow water-lily (A8 *Nuphar lutea* community) are present.

CFA21 Drayton Bassett, Hints and Weeford

Waggoner's Lane (Hedge 1) SBI (030-PH2-175001)

Site description and reasons for selection for survey

- 5.4.233 This is a managed semi-natural hedgerow on both sides of Bangley Lane (known locally as Waggoner's Lane), located south of the village of Hints that is designated as a Staffordshire Site of Biological Importance (SBI). Hedgerows are also a habitat of principal importance.

Vegetation communities present

- 5.4.234 The hedgerow is composed of hawthorn and blackthorn with scattered pedunculate oak standards. Other woody species occasionally recorded include wild apple, hazel, elder and field maple. A length was surveyed which falls within 100m of the land required for the construction of the Proposed Scheme. A 50m section in front of Mill House on the northern side of the Bangley Lane (known locally as Waggoner's Lane) is a species-poor Leyland cypress hedge. Honeysuckle and black bryony are occasionally found in the hedge. The ground flora includes frequent ivy, bramble, cow parsley, and false oat-grass. Wood sage was occasionally recorded.
- 5.4.235 This vegetation community was identified in the field as W21a *Crataegus monogyna*-*Hedera helix* scrub, *Hedera helix*-*Urtica dioica* sub-community, a widespread and very common vegetation community of lowland British hedgerows. The road verge has a narrow zone of the common and widespread MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub community, typical of unmanaged road verges.

Table 83: NVC frequency table for Waggoner's Lane Hedgerow

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Crataegus monogyna</i>	8	8	9	10	8	V (8-10)
<i>Sambucus nigra</i>	2	3	4	-	3	IV (2-4)
<i>Corylus avellana</i>	5	7	-	-	-	II (5-7)
<i>Quercus robur</i>	-	2	-	-	1	II (1-2)
<i>Prunus spinosa</i>	5	-	-	-	3	II (3-5)
<i>Acer campestre</i>	-	-	-	-	4	I (4)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Malva sylvestris</i>	-	4	-	-	-	I (4)
Moss species.	8	7	7	8	8	V (7-8)
<i>Rubus fruticosus</i> agg.	5	5	8	8	7	V (5-8)
<i>Arrhenatherum elatius</i>	8	8	4	7	4	V (4-8)
<i>Anthriscus sylvestris</i>	4	6	3	2	3	V (2-6)
<i>Hedera helix</i>	7	-	5	6	7	IV (5-7)
<i>Galium aparine</i>	-	3	2	6	3	IV (2-6)
<i>Urtica dioica</i>	-	-	7	-	3	II (3-7)
<i>Teucrium scorodonia</i>	6	4	-	-	-	II (6-4)
<i>Lamium album</i>	3	3	-	-	-	II (3)
<i>Heracleum sphondylium</i>	-	-	1	-	3	II (1-3)
<i>Brachythecium rutabulum</i>	-	-	-	8	-	I (8)
<i>Stellaria graminea</i>	6	-	-	-	-	I (6)
<i>Alliaria petiolata</i>	-	5	-	-	-	I (5)
<i>Lonicera periclymenum</i>	-	-	5	-	-	I (5)
<i>Rosa canina</i>	-	-	-	-	4	I (4)
<i>Tamus communis</i>	-	-	-	-	4	I (4)
<i>Cirsium arvense</i>	-	-	-	-	3	I (3)
<i>Senecio jacobaea</i>	2	-	-	-	-	I (2)
<i>Stellaria holostea</i>	2	-	-	-	-	I (2)
<i>Fraxinus excelsior</i>	-	-	-	1	-	I (1)
<i>Vicia tetrasperma</i>	1	-	-	-	-	I (1)

Roundhill Wood SBI (030-PH2-176001)

Site description and reasons for selection for survey

- 5.4.236 This site is ancient woodland, listed on the Natural England inventory, on an escarpment south of the village of Hints. It is designated as a Staffordshire SBI, and is lowland mixed deciduous woodland, a habitat of principal importance. The woodland has been replanted with sycamore and structural variation is poor, with the majority of the trees even-aged. There is evidence of game management for shooting, particularly for pheasants.

Vegetation communities present

- 5.4.237 This woodland is dominated by a high forest canopy of even-aged sycamore approximately 20-25m tall. Remnants of the original native canopy are a minor constituent of the wood, and include pedunculate oak, ash, and birch, some of the latter is present as standing dead wood. Rhododendron is dominant in the lower shrub

layer and elsewhere Indian balsam is spreading along the path areas, particularly on the south-facing aspects.

- 5.4.238 Within clearings in the understorey the ground flora consists of bracken, bluebell, grasses and abundant sycamore and Norway maple (*Acer platanoides*) regeneration seedlings, but few saplings are present. There is a small patch of dog's mercury on the hilltop, but there was relatively little variety in the field layer.
- 5.4.239 Most of the woodland is W10d *Quercus robur*–*Pteridium aquilinum*–*Rubus fruticosus* woodland, *Holcus lanatus* sub-community (with a relatively low MATCH coefficient of similarity of 44%), although due to modification of the ground flora and canopy it is a species-poor example. This community is common throughout lowland Britain in plantations and disturbed woodlands on base-poor soils.

Table 84: NVC frequency table for Roundhill Wood

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Acer pseudoplatanus</i>	9	10	9	9	9	V (9-10)
<i>Rhododendron ponticum</i>	9	8	8	8	7	V (7-9)
<i>Betula pendula</i>	4	4	4	5	4	V (4-5)
<i>Quercus robur</i>	4	2	-	4	4	IV (2-4)
<i>Fraxinus excelsior</i>	4	4	-	5	-	III (4-5)
<i>Acer platanoides</i>	4	-	4	-	-	II (4)
<i>Corylus avellana</i>	2	-	-	-	-	I (2)
<i>Prunus laurocerasus</i>	1	-	-	-	-	I (1)
<i>Sambucus nigra</i>	1	-	-	-	-	I (1)
<i>Hyacinthoides non-scripta</i>	3	4	4	5	5	V (3-5)
<i>Acer pseudoplatanus</i> (seedling)	4	2	4	1	4	V (1-4)
<i>Crataegus monogyna</i> (seedling)	2	1	1	1	1	V (1-2)
<i>Impatiens glandulifera</i>	1	1	1	10	-	IV (1-10)
<i>Silene dioica</i>	4	7	5	-	7	IV (4-7)
<i>Acer platanoides</i> (seedling)	2	1	-	1	2	IV (1-2)
<i>Pteridium aquilinum</i>	-	-	8	3	-	III (3-8)
<i>Rubus fruticosus</i> agg.	4	1	-	-	7	III (1-7)
<i>Poa trivialis</i>	4	5	-	-	4	III (4-5)
<i>Digitalis purpurea</i>	3	-	4	-	2	III (2-4)
<i>Fraxinus excelsior</i> (seedling)	2	2	-	1	-	III (1-2)
<i>Dryopteris dilatata</i>	-	-	-	4	4	II (4)
<i>Urtica dioica</i>	4	4	-	-	-	II (4)
<i>Stellaria media</i>	1	-	-	-	3	II (1-3)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Epilobium montanum</i>	1	1	-	-	-	II (1)
<i>Quercus robur</i> (seedling)	-	-	1	-	1	II (1)
<i>Dryopteris filix-mas</i>	-	5	-	-	-	I (5)
<i>Agrostis capillaris</i>	4	-	-	-	-	I (4)
<i>Holcus lanatus</i>	-	4	-	-	-	I (4)
<i>Moehringia trinervia</i>	-	-	-	-	2	I (2)
<i>Stellaria neglecta</i>	-	-	-	-	1	I (1)
<i>Anagallis arvensis</i>	1	-	-	-	-	I (1)
<i>Sambucus nigra</i>	1	-	-	-	-	I (1)
<i>Sonchus oleraceus</i>	1	-	-	-	-	I (1)

Hints Meadow East (part of the Snake's Hill and River Oxbow, Black Brook SBI) (030-PH2-177002)

Site description and reasons for selection for survey

- 5.4.240 This site is a field (2.2ha) alongside the north-eastern bank of Black-Bourne Brook to the west of Hints. This site is part of the Snake's Hill and River Oxbow, Black Brook SBI in Staffordshire and includes coastal and floodplain grazing marsh which is a habitat of principal importance. The grassland grades into wet woodland alongside the brook, which is also a habitat of principal importance. The majority of the site is covered by a species-rich swamp surrounded by water-margin vegetation and marshy grassland. On the higher slopes of the field there is improved grazing pasture.

Vegetation communities present

- 5.4.241 The large majority of the site is covered by a species-rich swamp with standing water of depth between 100 and 600mm. The constant species include soft rush, purple loosestrife (*Lythrum salicaria*), common marsh-bedstraw, water forget-me-not and gypsywort. Bulrush, skullcap and water figwort are frequent in the wetter areas, and there are occasional water mint, celery-leaved buttercup, marsh horsetail (*Equisetum palustre*) and sharp flowered rush. This swamp community most closely resembles S12b *Typha latifolia* swamp *Mentha aquatica* sub-community, particularly in the deeper water areas (MATCH coefficient of 54%). This community is common within the agricultural lowlands of Britain.

Table 85: NVC frequency table for wet grassland and mire at Hints Meadow East

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Juncus effusus</i>	8	8	6	8	7	V (6-8)
<i>Juncus acutiflorus</i>	-	-	5	-	7	V (5-7)
<i>Lythrum salicaria</i>	5	5	5	4	4	V (4-5)
<i>Myosotis scorpioides</i>	4	2	5	3	4	V (2-5)
<i>Cardamine flexuosa</i>	3	2	2	2	3	V (2-3)
<i>Lycopus europaeus</i>	3	2	2	2	2	V (2-3)
<i>Lemna</i> sp.	5	5	-	4	7	IV (4-7)
<i>Galium palustre</i>	6	-	5	2	2	IV (2-6)
<i>Plagiomnium undulatum</i>	5	2	-	-	4	III (2-5)
<i>Scutellaria galericulata</i>	4	3	-	-	3	III (3-4)
<i>Scrophularia nodosa</i>	-	4	1	-	2	III (1-4)
<i>Typha latifolia</i>	2	3	-	3	-	III (2-3)
<i>Equisetum</i> sp.	-	-	2	-	7	II (2-7)
<i>Glyceria fluitans</i>	-	-	4	3	-	II (3-4)
<i>Mentha aquatica</i>	-	-	4	3	-	II (3-4)
<i>Alnus glutinosa</i>	3	2	-	-	-	II (2-3)
<i>Urtica dioica</i>	-	-	-	2	2	II (2)
<i>Caltha palustris</i>	1	1	-	-	-	II (1)
<i>Impatiens glandulifera</i>	-	2	-	-	-	I (2)
<i>Ranunculus sceleratus</i>	-	-	2	-	-	I (2)
<i>Sparganium erectum</i>	-	-	1	-	-	I (1)
<i>Salix</i> sp. (sapling)	-	-	-	-	1	I (1)

- 5.4.242 A small patch (15x10m) within this habitat has locally dominant common spike-rush (*Eleocharis palustris*) with occasional floating sweet-grass, common marsh-bedstraw and water mint. This swamp community is S19 *Eleocharis palustris* swamp, which has a scattered distribution and relatively localised and uncommon in England.
- 5.4.243 A large patch of lesser pond sedge has gained dominance in a drier area of the swamp of water depth of 10mm. The species diversity of this community is low including water mint, gypsywort, purple loosestrife and marsh bedstraw at low cover values. This vegetation community (Table 86) is S7 *Carex acutiformis* swamp, which is a community found across lowland Britain, although rarely in large stands.

Table 86: NVC frequency table for sedge-dominated area at Hints Meadow East

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Carex acutiformis</i>					10	I (10)
<i>Impatiens glandulifera</i>					4	I (4)
<i>Mentha aquatica</i>					4	I (4)
<i>Lythrum salicaria</i>					3	I (3)
<i>Cardamine flexuosa</i>					3	I (3)
<i>Galium aparine</i>					2	I (2)
<i>Galium palustre</i>					2	I (2)
<i>Lycopus europaeus</i>					2	I (2)

- 5.4.244 At the edge of the swamp habitat and the wet woodland is a marginal habitat dominated by floating sweet-grass associated with other aquatic species including duckweed, common marsh-bedstraw, lesser spearwort, water forget-me-not and marsh marigold. This vegetation community is S22a *Glyceria fluitans* swamp *Glyceria fluitans* sub-community (MATCH coefficient of 41%). In drier areas on the outermost part of the swamp habitat, floating sweet-grass is still dominant but is frequently recorded with marsh foxtail, rough meadow-grass and Yorkshire fog. The herb cover is species-poor limited to frequent creeping buttercup with occasional cuckoo flower and bog stitchwort (*Stellaria alsine*). This vegetation community (Table 87) is S22c *Glyceria fluitans* swamp, *Alopecurus geniculatus* sub-community (coefficient of similarity of 50%). These sub-communities are widespread and common throughout lowland Britain often found as marginal vegetation of watercourses.

Table 87: NVC frequency table for marginal grassland community at Hints Meadow East

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Glyceria fluitans</i>	10	10	8	8	9	VI (8-10)
<i>Poa trivialis</i>	2	2	2	4	4	VI (2-4)
<i>Ranunculus repens</i>	-	-	7	2	1	IV (1-7)
<i>Cardamine pratensis</i>	2	1	2	-	4	IV (1-4)
<i>Holcus lanatus</i>	-	-	7	-	5	III (4-7)
<i>Myosotis scorpioides</i>	-	4	-	4	1	III (1-4)
<i>Alopecurus geniculatus</i>	2	2	-	2	-	III (2)
<i>Galium palustre</i>	2	2	-	2	-	III (2)
<i>Lycopus europaeus</i>	2	2	-	2	-	III (2)
<i>Lemna minor</i>	4	5	-	-	-	II (4-5)
<i>Juncus effusus</i>	-	-	1	4	-	II (1-4)
<i>Ranunculus flammula</i>	-	-	7	-	-	I (7)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Stellaria alsine</i>	-	-	-	-	3	I (3)
<i>Trifolium repens</i>	-	-	2	-	-	I (2)

- 5.4.245 The wet woodland is dominated by alder as multi-stemmed mature trees forming a dense high canopy. The woodland was flooded with deep water above waist height at the time of survey preventing full access. The understorey was limited to isolated patches of rushes, ferns and sedges and rafts of floating sweet grass. The woodland was identified in the field as *W5 Alnus glutinosa-Carex paniculata* woodland, a widespread, but local wet woodland community of permanently waterlogged mires with peaty substrate in central, southern and eastern Britain.

Hints Meadow West (030-PH2-177003)

Site description and reasons for selection for survey

- 5.4.246 This site includes the southern end of a pasture field at Buck's Head Farm, Hints, on the western bank of Black-Bourne Brook. This site has coastal and floodplain grazing marsh, a habitat of principal importance but is not a designated site. There is a wet ditch running parallel to the brook within the site. The northern end of the field is rush pasture, whilst the southern end of the field contains permanently wet runnels where swamp vegetation has established. The field is grazed and the wet areas are likely to be disturbed by sheep or cattle, which maintain the open structure.

Vegetation communities present

- 5.4.247 The vegetation community in the north eastern part of the field that borders the ditch is dominated by soft rush, Yorkshire fog and marsh foxtail. There is no standing water and the sward is species-poor. The only constant herbaceous species are creeping buttercup and broad-leaved dock. This vegetation community (Table 88) is *MG10a Holcus lanatus-Juncus effusus* rush pasture, typical sub-community (MATCH coefficient of similarity of 38%), a common community of damp agricultural pastures.

Table 88: NVC frequency table for grassland community at Hints Meadow West

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Glyceria maxima</i>	7	9	7	7	4	V (4-9)
<i>Alopecurus geniculatus</i>	8	10	4	7	10	V (4-10)
<i>Deschampsia caespitosa</i>	4	4	6	4	2	V (2-6)
<i>Holcus lanatus</i>	4	3	3	3	3	V (3-4)
<i>Ranunculus repens</i>	1	-	1	1	4	IV (1-4)
<i>Lythrum salicaria</i>	-	-	2	-	3	II (2-3)
<i>Juncus effusus</i>	-	4	4	8	5	IV (4-8)
<i>Rumex obtusifolius</i>	-	1	1	1	1	IV (1)
<i>Juncus articulatus</i>	-	-	-	-	1	I (1)
<i>Galium palustre</i>	-	-	-	3	2	II (2-3)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Phalaris arundinacea</i>	-	-	-	1	2	II (1-2)
<i>Myosotis scorpioides</i>	-	-	-	-	2	I (2)

5.4.248 The lower lying south eastern side of the field that borders the wet ditch contains runnels of standing water up to 100mm deep. In these localised wet areas swamp vegetation has established with constant species including reed sweet grass and soft rush. There is a species rich assemblage of herbaceous species including water forget-me-not, gypsywort, water mint, brooklime (*Veronica beccabunga*) and common marsh-bedstraw, which are frequent in abundance. Twenty eight species were recorded in this vegetation community. This vegetation community (Table 89) was identified in the field as S5 *Glyceria maxima* swamp community, a widespread and common community of ditches and watercourse margins.

Table 89: NVC frequency table for wet runnel community at Hints Meadow West

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Phalaris arundinacea</i>	6	-	-	-	-	I (6)
<i>Mentha aquatica</i>	4	2	-	4	1	IV (1-4)
<i>Juncus effusus</i>	7	9	2	7	4	V (4-9)
<i>Myosotis scorpioides</i>	3	9	9	7	6	V (3-9)
<i>Rumex conglomeratus</i>	2	2	-	2	-	III (2)
<i>Urtica dioica</i>	3	2	-	-	-	II (2)
<i>Alopecurus geniculatus</i>	8	-	-	5	3	III (3-8)
<i>Deschampsia cespitosa</i>	3	3	-	4	-	III (3-4)
<i>Lycopus europaeus</i>	3	5	3	3	1	V (1-5)
<i>Filipendula ulmaria</i>	2	-	-	-	-	I (2)
<i>Holcus lanatus</i>	3	-	-	-	-	I (3)
<i>Impatiens capensis</i>	-	1	2	-	-	II (1-2)
<i>Alisma plantago-aquatica</i>	-	4	-	-	-	I (4)
<i>Lythrum salicaria</i>	-	2	-	-	-	I (2)
<i>Apium nodiflorum</i>	-	2	-	-	-	I (2)
<i>Veronica beccabunga</i>	-	2	5	-	3	III (2-5)
<i>Callitriche stagnalis</i>	-	4	-	-	5	II (4-5)
<i>Glyceria maxima</i>	-	7	-	3	6	III (3-6)
<i>Epilobium ciliata</i>	-	2	-	-	-	I (2)
<i>Atriplex prostrata</i>	-	1	-	-	-	I (1)
<i>Rorippa palustris</i>	-	-	-	6	4	II (4-6)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Ranunculus repens</i>	-	-	-	4	-	I (4)
<i>Galium palustre</i>	-	-	-	4	-	I (4)
<i>Eleocharis palustris</i>	-	-	-	-	3	I (3)
<i>Juncus articulatus</i>	-	-	-	-	2	I (2)
<i>Typha latifolia</i>	-	-	-	-	1	I (2)
<i>Persicaria maculosa</i>	-	-	-	-	1	I (1)

- 5.4.249 The vegetation community on the banks of the ditch is dominated by reed canary-grass, meadowsweet and purple loosestrife. The plants within the ditch are limited to amphibious bistort, which is present in both terrestrial and aquatic forms. The ditch bankside community was identified as S28 *Phalaris arundinacea* tall herb fen community, which is a common community of the margins of waterbodies in lowland Britain.

Moor Covert SBI (030-PH2-179001)

Site description and reasons for selection for survey

- 5.4.250 This small woodland (approximately 2ha) is at the head of a stream and adjacent to a large pond to the north of the site. It is otherwise surrounded by arable land. The stream bisects the woodland longitudinally and joins up with the pond. The woodland is mixed broad-leaved and pine and is not listed as ancient woodland on the Natural England inventory although it is present on the OS County Series map of Staffordshire from the 1880s⁴⁶. Evidence of game management was recorded in the south-west corner of the woodland in the form of pheasant pens and feeding stations. It is designated as a Staffordshire SBI.

Vegetation communities present

- 5.4.251 The dominant canopy tree is planted sycamore that forms an even aged high canopy of up to 20m. Planted Scots pine is also present. Remnants of the original canopy present include silver birch and occasional semi-mature pedunculate oak standards. The under storey is species poor and limited due to heavy shading of the high canopy. Rhododendron, elder and bramble are present in the shrub layer. Broad buckler fern and common feather-moss are frequent in the ground flora, and other species recorded occasionally within the woodland include bracken, hedge woundwort and foxglove. Where the woodland borders the ditch on the eastern side of the woodland, conditions are locally wet and alder and cracked willow are co-dominant with sycamore and silver birch. Common nettle is more frequent here and ivy covers the tree trunks. Bluebell is present, but rare in this community. This woodland represents a species-poor remnant of W10 *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, which is a common and widespread woodland community, found on base-poor soils in lowland Britain.

⁴⁶ Ordnance Survey (1883-1887), County Series Map of Staffordshire, 1:2500 scale.

Table 90: NVC frequency table for Moor Covert

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Acer pseudoplatanus</i>	10	9	8	7	7	V (7-10)
<i>Betula pendula</i>	1	1	4	-	5	IV (1-5)
<i>Salix fragilis</i>	-	-	4	4	-	II (4)
<i>Alnus glutinosa</i>	-	-	2	-	4	II (2-4)
<i>Quercus robur</i>	-	1	-	-	-	I (1)
<i>Sambucus nigra</i>	2	2	7	3	4	V (2-7)
<i>Dryopteris dilatata</i>	3	4	2	7	3	V (2-7)
<i>Rubus fruticosus</i> agg.	2	6	4	4	2	V (2-6)
<i>Kindbergia praelonga</i>	-	5	6	2	2	IV (2-6)
<i>Urtica dioica</i>	-	1	4	3	-	III (1-4)
<i>Stachys sylvatica</i>	-	1	1	1	-	III (1)
<i>Hedera helix</i>	-	2	-	2	4	II (2-4)
<i>Hyacinthoides non-scripta</i>	-	-	-	1	3	II (1-3)
<i>Pteridium aquilinum</i>	6	-	-	-	-	I (6)
<i>Stellaria media</i>	-	3	-	-	-	I (3)

CFA22 Whittington to Handsacre

Whittington Heath Golf Course SBI (030-PH2-181001)

Site description and reasons for selection for survey

- 5.4.252 Whittington Heath is a relatively large site of remnant heathland containing an 18-hole golf course and is a SBI in Staffordshire. It has stands of lowland heathland, dry acid grassland and lowland mixed deciduous woodland, all habitats of principal importance. The site was formerly a single block of heathland known as Whittington Heath. This is shown on the OS map as far back as 1844. The site is on underlying geology known as Kidderminster Formations, which is formed of Interbedded Sandstone and Conglomerate. The soil is noticeably free-draining and acidic.
- 5.4.253 The golf course is laid out amongst blocks and linear strips of secondary woodland. The variable conditions formed through the management of the golf course has resulted in a range of communities, from purely open communities that require regular cutting to persist to unmanaged woodland. There is further variation due to slight changes in moisture content of the soil caused by position and aspect. Some patches of pure heath vegetation are present, as are patches and strips of dry and damp acid grassland, in particular at the edges of the fairways (the 'rough'), below the tees, and in clearings in undeveloped locations of the site.

Vegetation communities present

- 5.4.254 A damp acid grassland community is present on the edges of fairways, often in the shade of the adjacent wooded areas. Management, such as cutting and watering is

likely to cause this community to persist. This is the dominant grassland community at the site. The grasses sheep's fescue (*Festuca ovina*), common bent and mat grass (*Nardus stricta*) are prominent and frequent throughout the sward, and there is scattered wavy hair-grass (*Deschampsia flexuosa*). Heath bedstraw (*Galium saxatile*) is a common associate and heather is occasionally recorded. Springy turf-moss (*Rhytidiadelphus squarrosus*) and heath plait-moss (*Hypnum jutlandicum*) are found beneath the coarse field layer. This damp acid grassland community (Table 91) is U4e *Festuca ovina*-*Agrostis capillaris*-*Galium saxatile* grassland, *Vaccinium myrtillus*-*Deschampsia flexuosa* sub-community (MATCH coefficient of similarity of 52%), a grassland community that is ubiquitous in upland pastures but much less common in lowland Britain.

Table 91: NVC frequency table for damp acid grassland community at Whittington Heath Golf Course

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Festuca ovina</i> agg.	5	2	6	2	6	V (2-6)
<i>Agrostis capillaris</i>	4	3	3	2	4	V (2-4)
<i>Galium saxatile</i>	1	1	2	2	1	V (1-2)
<i>Nardus stricta</i>	4	8	-	2	5	IV (2-8)
<i>Holcus lanatus</i>	2	-	1	6	1	IV (1-6)
<i>Deschampsia flexuosa</i>	2	1	4	4	-	IV (1-4)
<i>Luzula multiflora</i>	-	2	4	3	-	III (2-4)
<i>Rhytidiadelphus squarrosus</i>	-	3	-	-	1	II (1-3)
<i>Calluna vulgaris</i>	2	-	-	1	-	II (1-2)
<i>Holcus mollis</i>	-	-	4	-	-	I (4)
<i>Brachypodium sylvaticum</i>	3	-	-	-	-	I (3)
<i>Hypnum jutlandicum</i>	-	3	-	-	-	I (3)
<i>Ranunculus repens</i>	-	-	-	-	3	I (3)
<i>Carex pilulifera</i>	-	2	-	-	-	I (2)
<i>Pteridium aquilinum</i>	-	-	2	-	-	I (2)
<i>Aira praecox</i>	-	1	-	-	-	I (1)
<i>Dactylis glomerata</i>	-	-	-	-	1	I (1)
<i>Danthonia decumbens</i>	-	1	-	-	-	I (1)
<i>Pilosella officinarum</i>	-	-	-	-	1	I (1)
<i>Quercus robur</i> (sapling)	1	-	-	-	-	I (1)
<i>Ulex europaeus</i>	-	2	-	-	-	I (2)
<i>Vicia sativa</i>	-	-	-	-	1	I (1)

5.4.255 In certain locations there are a few patches of a very similar acid grassland community that is present on drier soil profiles such as on steep banks. Sheep's fescue is again

frequent with common bent, mat grass and wavy hair-grass less so. Prominent in this community is abundant sheep's sorrel (*Rumex acetosella*), whereas heath bedstraw is only occasionally recorded. This dry acid grassland community (Table 92) is U1e *Festuca ovina*-*Agrostis capillaris*-*Rumex acetosella* grassland, *Galium saxatile*-*Potentilla erecta* sub-community (MATCH coefficient of 53%), which is widespread but local on suitable dry soils in lowland Britain, less common in the north and west.

Table 92: NVC frequency table for dry acid grassland community at Whittington Heath Golf Course

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Rumex acetosella</i>				2	8	II (2-8)
<i>Festuca ovina</i> agg.				5	5	II (5)
<i>Holcus lanatus</i>				2	4	II (2-4)
<i>Cerastium fontanum</i>				1	1	II (1)
<i>Deschampsia cespitosa</i>				7	-	I (7)
<i>Agrostis capillaris</i>				4	-	I (4)
<i>Deschampsia flexuosa</i>				-	4	I (4)
<i>Rhytidiadelphus squarrosus</i>				4	-	I (4)
<i>Nardus stricta</i>				3	-	I (3)
<i>Aira praecox</i>				2	-	I (2)
<i>Aphanes arvensis</i>				2	-	I (2)
<i>Calluna vulgaris</i>				-	2	I (2)
<i>Galium saxatile</i>				-	2	I (2)
<i>Poa annua</i>				2	-	I (2)

- 5.4.256 There are patches of heath dominated by heather (*Calluna vulgaris*) in locations where mowing is deliberately less frequent, or in inaccessible areas such as very steep banks. It is likely that there has been some deliberate management to retain the heath, which is a favoured habitat on golf courses where it occurs. Other than heather, the species found in the adjacent acid grassland communities are present at low frequency and there are a few stands of gorse (*Ulex europaeus*). This heathland community (Table 93) was identified as Hgd *Calluna vulgaris*-*Deschampsia flexuosa* heath, *Galium saxatile* sub-community (MATCH coefficient of 52%), which is the characteristic heath community of suitable sites in the Midland lowlands.

Table 93: NVC frequency table for heathland community at Whittington Heath Golf Course

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Calluna vulgaris</i>	8	7	8	8	8	V (7-8)
<i>Galium saxatile</i>	2	4	1	3	3	V (1-4)
<i>Nardus stricta</i>	4	4	5	-	4	IV (4-5)
<i>Deschampsia flexuosa</i>	-	4	1	4	1	IV (1-4)
<i>Agrostis capillaris</i>	2	1	1	-	-	III (1-2)
<i>Quercus robur</i> (sapling)	1	-	1	2	-	III (1-2)
<i>Rumex acetosella</i>	2	-	-	2	-	II (2)
<i>Ulex europaeus</i>	-	1	-	2	-	II (1-2)
<i>Betula pendula</i> (sapling)	1	1	-	-	-	II (1)
<i>Festuca ovina</i> agg.	-	-	1	1	-	II (1)
<i>Hypnum jutlandicum</i>	-	-	3	-	-	I (3)
<i>Rhytidiadelphus squarrosus</i>	-	-	3	-	-	I (3)
<i>Danthonia decumbens</i>	-	-	-	-	2	I (2)
<i>Digitalis purpurea</i>	-	-	-	2	-	I (2)
<i>Holcus mollis</i>	-	2	-	-	-	I (2)
<i>Juncus squarrosus</i>	2	-	-	-	-	I (2)
<i>Chamerion angustifolium</i>	1	-	-	-	-	I (1)
<i>Holcus lanatus</i>	-	-	-	1	-	I (1)
<i>Juncus effusus</i>	1	-	-	-	-	I (1)
<i>Luzula multiflora</i>	1	-	-	-	-	I (1)
<i>Molinia caerulea</i>	-	1	-	-	-	I (1)
<i>Pteridium aquilinum</i>	1	-	-	-	-	I (1)
<i>Rubus fruticosus</i> agg.	1	-	-	-	-	I (1)

5.4.257 Other open ground vegetation communities are present in isolated areas. These include the scrub community (Table 94) W25b *Pteridium aquilinum*-*Rubus fruticosus* underscrub, *Teucrium scorodonia* sub-community (MATCH coefficient of 44%); and the grassland community (Table 95) MG1b *Arrhenatherum elatius* grassland *Urtica dioica* sub-community (MATCH coefficient of 54%). These communities are widespread and common in suitable locations, the bracken scrub more confined to dry acidic soils.

Table 94: NVC frequency table for bracken community at Whittington Heath Golf Course

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Pteridium aquilinum</i>					8	I (8)
<i>Digitalis purpurea</i>					4	I (4)
<i>Holcus mollis</i>					4	I (4)
<i>Rubus fruticosus</i> agg.					4	I (4)
<i>Chamerion angustifolium</i>					1	I (1)

Table 95: NVC frequency table for coarse grassland community at Whittington Heath Golf Course

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Arrhenatherum elatius</i>				4	5	II (4-5)
<i>Rumex obtusifolius</i>				2	5	II (2-5)
<i>Festuca rubra</i> agg.				4	4	II (4)
<i>Urtica dioica</i>				2	4	II (2-4)
<i>Poa trivialis</i>				2	2	II (2)
<i>Agrostis capillaris</i>				4	-	I (4)
<i>Holcus lanatus</i>				4	-	I (4)
<i>Holcus mollis</i>				4	-	I (4)
<i>Poa pratensis</i>				4	-	I (4)
<i>Lolium perenne</i>				-	3	I (3)
<i>Lamium album</i>				-	2	I (2)
<i>Phleum pratense</i>				-	2	I (2)
<i>Anthriscus sylvestris</i>				-	1	I (1)
<i>Carex pilulifera</i>				1	-	I (1)
<i>Cerastium fontanum</i>				1	-	I (1)
<i>Cirsium arvense</i>				-	1	I (1)
<i>Dactylis glomerata</i>				1	-	I (1)
<i>Deschampsia flexuosa</i>				1	-	I (1)
<i>Galium aparine</i>				-	1	I (1)
<i>Luzula multiflora</i>				1	-	I (1)
<i>Plantago lanceolata</i>				-	1	I (1)
<i>Pteridium aquilinum</i>				1	-	I (1)
<i>Ranunculus repens</i>				-	1	I (1)
<i>Rumex crispus</i>				1	-	I (1)

Species	Quadrat locations					Constancy (Domin range)
				Q1	Q2	
<i>Stellaria media</i>				-	1	I (1)
<i>Taraxacum officinale</i>				1	-	I (1)

- 5.4.258 The woodland is dominated by even aged pedunculate oak, with silver birch only occasionally recorded. The shrub layer is sparse and holly is generally only present on the periphery of the site. The ground flora is characterised by open grassy patches with Yorkshire fog and creeping soft-grass equally abundant. Wavy hair-grass, bracken, bluebell and broad buckler-fern are also scattered throughout, and in places locally abundant. This woodland community (Table g6) is *W10d Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Holcus lanatus* sub-community (with a high MATCH coefficient of 66%), which is typical of relatively recent woodland stands on acidic soils in lowland Britain, such as mature woodland that has developed on a former heathland site.

Table g6: NVC frequency table for woodland community at Whittington Heath Golf Course

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	9	10	9	9	10	IV (9-10)
<i>Betula pendula</i>	1	-	1	1	-	III (1)
<i>Ilex aquifolium</i>	-	-	-	-	5	I (5)
<i>Taxus baccata</i>	-	-	-	-	1	I (1)
<i>Rubus fruticosus</i> agg.	4	1	7	-	5	IV (1-7)
<i>Deschampsia flexuosa</i>	4	5	2	-	2	IV (2-5)
<i>Holcus lanatus</i>	-	2	5	4	4	IV (2-5)
<i>Holcus mollis</i>	9	5	4	-	-	III (4-9)
<i>Pteridium aquilinum</i>	-	1	-	9	2	III (1-9)
<i>Kindbergia praelonga</i>	-	-	-	1	3	II (1-3)
<i>Dryopteris dilatata</i>	-	-	1	-	1	II (1)
<i>Chamerion angustifolium</i>	-	4	-	-	-	I (4)
<i>Atrichum undulatum</i>	-	-	2	-	-	I (2)
<i>Hedera helix</i>	-	-	-	-	2	I (2)
<i>Hyacinthoides non-scripta</i>	2	-	-	-	-	I (2)
<i>Arenaria serpyllifolia</i>	1	-	-	-	-	I (1)
<i>Deschampsia cespitosa</i>	-	-	-	1	-	I (1)
<i>Dryopteris carthusiana</i>	-	-	-	-	1	I (1)
<i>Galium aparine</i>	1	-	-	-	-	I (1)
<i>Galium saxatile</i>	-	1	-	-	-	I (1)
<i>Sorbus aucuparia</i> (sapling)	-	1	-	-	-	I (1)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Stellaria media</i>	1	-	-	-	-	I (1)

Curborough House Hedgerow SBI (030-PH2-187001)

- 5.4.259 This stretch of hedgerow alongside Netherstowe Lane to the north of Curborough is a Staffordshire SBI. Hedgerows are also a habitat of principal importance. The site surveyed included the hedgerows of Netherstowe Lane (450m length) south of the junction with Woodend Lane. The hedgerow is managed by flailing but no management of the verge was evident.
- 5.4.260 This species-rich hedgerow is approximately 1.5m high, has an associated dry ditch, mature standard trees, and species-rich ground flora. The most dominant woody species in the hedgerow is hawthorn with bramble, elder, field maple and hazel frequent. Mature pedunculate oak standard trees (up to 20m high) are frequent approximately every 50m. There is a verge of herbaceous vegetation in front of the hedgerow with a high diversity of herbaceous species present some of which are woodland ground flora species. The dominant species in the verge are false oat-grass and cow parsley, with creeping thistle, common couch, cleavers, bracken, wood sage, common nettle, hedge woundwort and white bryony (*Bryonia dioica*) also present.
- 5.4.261 This hedgerow community resembles W21a *Crataegus monogyna*-*Hedera helix* scrub, *Hedera helix*-*Urtica dioica* sub-community (MATCH coefficient of 46%), a very common and widespread hedgerow community.

Table 97: NVC frequency table for Curborough House Hedgerow

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	-	2	-	-	1	II (1-2)
<i>Crataegus monogyna</i>	8	8	9	10	8	V (8-10)
<i>Rubus fruticosus</i> agg.	5	5	8	8	7	V (5-8)
<i>Sambucus nigra</i>	2	3	4	-	3	IV (2-4)
<i>Acer campestre</i>	-	-	-	-	4	I (4)
<i>Corylus avellana</i>	5	7	-	-	-	II (5-7)
<i>Prunus spinosa</i>	5	-	-	-	3	II (3-5)
<i>Fraxinus excelsior</i>	-	-	-	1	-	I (1)
Feather moss	8	7	7	8	8	V (7-8)
<i>Arrhenatherum elatius</i>	8	8	4	7	4	V (4-8)
<i>Anthriscus sylvestris</i>	4	6	3	2	3	V (2-6)
<i>Hedera helix</i>	7	-	5	6	7	IV (5-7)
<i>Galium aparine</i>	-	3	2	6	3	IV (2-6)
<i>Urtica dioica</i>	-	-	7	-	3	II (3-7)
<i>Teucrium scorodonia</i>	6	4	-	-	-	II (6-4)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Lamium album</i>	3	3	-	-	-	II (3)
<i>Heracleum sphondylium</i>	-	-	1	-	3	II (1-3)
<i>Brachythecium rutabulum</i>	-	-	-	8	-	I (8)
<i>Stellaria graminea</i>	6	-	-	-	-	I (6)
<i>Alliaria petiolata</i>	-	5	-	-	-	I (5)
<i>Lonicera periclymenum</i>	-	-	5	-	-	I (5)
<i>Malva sylvestris</i>	-	4	-	-	-	I (4)
<i>Rosa canina</i>	-	-	-	-	4	I (4)
<i>Tamus communis</i>	-	-	-	-	4	I (4)
<i>Cirsium arvense</i>	-	-	-	-	3	I (3)
<i>Senecio jacobaea</i>	2	-	-	-	-	I (2)
<i>Stellaria holostea</i>	2	-	-	-	-	I (2)
<i>Vicia tetrasperma</i>	1	-	-	-	-	I (1)

Big Lyntus SBI (030-PH2-187002)

Site description and reasons for selection for survey

- 5.4.262 Big Lyntus is ancient woodland of 6.6ha located north of Curborough, and a SBI in Staffordshire. It is in part semi-natural (1.3ha), which is also lowland mixed deciduous woodland, a habitat of principal importance, and part replanted with conifers (5.3ha). Recent management for timber was not evident.

Vegetation communities present

- 5.4.263 The northern compartment of the site is replanted woodland with a high canopy (up to 30m) dominated by semi-mature beech and Scots pine trees. Silver birch, pedunculate oak and rowan are also present at lower abundance. The shrub layer is patchy and consists of occasional holly and low growing bramble. Ground flora is limited to edges of the compartment or patches where there are gaps in the canopy, where bluebell, common nettle and cleavers are the most frequent species. This woodland community (Table 98) resembles W15a *Fagus sylvatica-Deschampsia flexuosa* woodland, *Fagus sylvatica* sub-community (MATCH coefficient of 48%). This is a community that naturally occurs on base-poor soils in the south of Britain, but is widely developed in plantations managed for timber elsewhere in lowland Britain. Prior to clearance and replanting of beech and pine this woodland community is likely to have been similar to the semi-natural woodland community in the south of this site.

Table 98: NVC frequency table for pine and beech plantation at Big Lyntus

Species	Quadrat locations					Constancy (Domin range)
		Q1	Q2	Q3	Q4	
<i>Pinus sylvestris</i>		8	8	8	9	IV (8-9)
<i>Fagus sylvatica</i>		7	4	6	4	IV (4-7)
<i>Rubus fruticosus</i> agg.		-	6	7	6	III (6-7)
<i>Hyacinthoides non-scripta</i>		5	-	2	2	III (2-5)
<i>Brachythecium rutabulum</i>		-	5	5	-	II (5)
<i>Kindbergia praelonga</i>		-	5	5	-	II (5)
<i>Pteridium aquilinum</i>		-	-	-	7	I (7)
<i>Sorbus aucuparia</i>		-	6	-	-	I (6)
<i>Urtica dioica</i>		-	-	5	-	I (5)
<i>Galium aparine</i>		-	-	4	-	I (4)
<i>Quercus robur</i>		4	-	-	-	I (4)
<i>Ilex aquifolium</i>		3	-	-	-	I (3)

5.4.264 Between the northern compartment and a strip of semi-natural woodland on the southern boundary of the site is a more recent plantation dominated by pedunculate oak with occasional ash. The canopy of this compartment is up to 20m in height. The limited shrub layer consists of occasional hawthorn, bramble, elder and hazel. Due to a less developed and more open canopy, there is a ground flora dominated by a dense cover of bluebell, with greater stitchwort and wood anemone, and locally dominant creeping soft grass. This woodland community (Table 99) is a species-poor form of *W10b Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland *Anemone nemorosa* sub-community (MATCH gave a relatively low coefficient of 33%), which is typical of heavy base-poor soils in the south-east of Britain, but less common elsewhere. The species diversity is below that typical of this sub-community, due to the recent disturbance and replanting, and consequently it is a poor fit to the NVC.

Table 99: NVC frequency table for oak-dominated plantation at Big Lyntus

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Fraxinus excelsior</i>	5	4	4	4	4	V (4-5)
<i>Quercus robur</i>	8	5	-	2	4	IV (2-8)
<i>Populus alba</i>	-	-	5	3	3	III (3-5)
<i>Corylus avellana</i> (canopy)	-	-	6	-	-	I (6)
<i>Betula pendula</i>	-	6	4	-	-	II (4-6)
<i>Corylus avellana</i> (shrub)	6	7	8	8	8	V (6-8)
<i>Sambucus nigra</i>	2	5	-	4	6	IV (2-6)
<i>Ilex aquifolium</i>	5	2	-	-	5	II (2-5)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Lonicera periclymenum</i> (climber)	4	-	-	-	4	II (4)
<i>Crataegus monogyna</i>	4	-	-	1	-	II (1-4)
<i>Holcus mollis</i>	6	2	1	5	3	V (1-6)
<i>Rubus fruticosus</i> agg.	3	5	4	2	5	V (2-5)
<i>Lamium galeobdolon</i> ssp. <i>montanum</i>	-	7	4	4	4	IV (4-7)
<i>Anemone nemorosa</i>	4	-	9	4	-	III (4-9)
<i>Hyacinthoides non-scripta</i>	6	7	-	3	8	III (3-8)
<i>Adoxa moschatellina</i>	-	-	8	-	-	I (8)
<i>Mercurialis perennis</i>	-	-	6	-	-	I (6)
<i>Stellaria holostea</i>	6	-	-	-	-	I (6)
<i>Oxalis acetosella</i>	-	-	5	-	-	I (5)
<i>Alnus glutinosa</i>	-	-	4	-	-	I (4)
<i>Prunus avium</i>	-	-	4	-	-	I (4)
<i>Silene dioica</i>	-	-	3	-	-	I (3)
<i>Allium ursinum</i>	-	-	2	-	-	I (2)
<i>Lonicera periclymenum</i>	2	-	-	-	-	I (2)
<i>Ribes rubrum</i>	-	-	1	-	-	I (1)

- 5.4.265 The strip of semi-natural ancient woodland in the south of the site is structurally and botanically more diverse than the plantation compartments. The canopy is dominated by pedunculate oak with frequent ash and occasional wild cherry, silver birch and alder. There is a defined sub-canopy of hazel and a well-developed scrub layer with holly, hawthorn, elder and scrambling honeysuckle. The woodland ground flora is diverse with a number of indicators of ancient woodland, including bluebell, moschatel, wood anemone, yellow archangel, wild garlic and wood sorrel. The woodland community (Table 100) of this compartment is also W10b *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland *Anemone nemorosa* sub-community, but a better fit to the published NVC description (MATCH coefficient of 44%) and a greater species-richness than the above compartment.

Table 100: NVC frequency table for semi-natural woodland at Big Lyntus

Species	Quadrat locations					Constancy (Domin range)
			Q1	Q2	Q3	
<i>Quercus robur</i>			9	9	10	III (9-10)
<i>Corylus avellana</i>			6	2	-	II (2-6)
<i>Sambucus nigra</i>			4	-	-	I (4)
<i>Holcus mollis</i>			10	5	8	III (5-10)
<i>Hyacinthoides non-scripta</i>			2	7	7	III (2-7)
<i>Rubus fruticosus</i> agg.			6	3	-	II (3-6)
<i>Stellaria holostea</i>			-	7	-	I (7)
<i>Ilex aquifolium</i>			-	4	-	I (4)

Fradley Wood BAS (030-PH2-187003)

Site description and reasons for selection for survey

- 5.4.266 Fradley Wood includes secondary woodland adjacent to the eastern bank of the Trent and Mersey Canal, Staffordshire, and Brokendown Wood on the opposite (western) side of the canal. Although not designated as a Staffordshire SBI, it is listed as a Biodiversity Alert Site. The site is made up of blocks of woodland and areas of scrub. Fradley Wood was formerly combined into a single wood, shown on the OS County Series map of Staffordshire from the 1880s⁴⁷, but is now somewhat fragmented. The woodland is not listed as ancient woodland on the Natural England inventory, but the site includes lowland mixed deciduous woodland, a habitat of principal importance.
- 5.4.267 A compartment of Fradley Wood adjacent to the eastern bank of the canal was surveyed as part of the NVC survey. This compartment is known as Fradley Gorse. The woodland compartment is flat but intersected by a number of dry ditches and there is an abundance of fallen dead wood. Mature trees are spread out in the canopy approximately 20m apart, giving the woodland an open structure with a dense scrub layer and tall ruderal vegetation.

Vegetation communities present

- 5.4.268 The canopy is composed of frequent silver birch and pedunculate oak with occasional hazel and there are few individuals of hornbeam, holly and sessile oak. The shrub layer covers 50% of the compartment and is dominated by bramble, hawthorn, elder and honeysuckle. The ground flora has abundant broad buckler fern and male fern with occasional bracken, especially in clearings. There is a distinctive field layer of mosses, with common feather-moss and swan's-neck thyme-moss (*Mnium hornum*) prominent. Other herbaceous species in the ground flora are limited to wood sage, red campion and rosebay willowherb in the more open areas. Bilberry (*Vaccinium myrtillus*) was common along the edge of the canal that borders this woodland.
- 5.4.269 This woodland community (Table 101) is W10d *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, *Holcus lanatus* sub-community (MATCH coefficient of

⁴⁷ Ordnance Survey (1883-1887), County Series Map of Staffordshire, 1:2500 scale.

42%) typical of disturbed and secondary woodlands on base-poor soils in lowland Britain.

Table 101: NVC frequency table for woodland compartment at Fradley Wood

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i>	8	8	8	8	8	V (8)
<i>Betula pendula</i>	4	4	4	4	4	V (4)
<i>Lonicera periclymenum</i>	9	7	2	2	4	V (2-9)
<i>Rubus fruticosus</i> agg.	5	5	8	8	3	V (3-8)
<i>Crataegus monogyna</i>	5	-	-	-	-	I (5)
<i>Corylus avellana</i>	3	-	-	-	-	I (3)
<i>Kindbergia praelonga</i>	6	8	8	10	6	V (6-10)
<i>Mnium hornum</i>	6	5	5	4	8	V (4-8)
<i>Dryopteris dilatata</i>	4	5	4	7	3	V (3-7)
<i>Teucrium scorodonia</i>	2	8	-	-	2	III (3-7)
<i>Chamerion angustifolium</i>	-	2	4	4	-	III (2-4)
<i>Digitalis purpurea</i>	3	1	3	-	-	III (1-3)
<i>Dryopteris filix-mas</i>	-	-	4	-	4	II (4)

Trent and Mersey Canal, Fradley (within King's Bromley Wharf to Fradley Junction, Coventry Canal SBI) (030-PH2-188002)

Site description and reasons for selection for survey

- 5.4.270 The Trent and Mersey canal near Fradley in Staffordshire was surveyed along an approximate 2km section between Slaish and Fradley Wood. The site is included within King's Bromley Wharf to Fradley Junction, Coventry Canal SBI (Staffordshire) and includes eutrophic standing water, which is a habitat of principal importance. The canal has sluggish flow rates and is heavily silted from frequent disturbance of sediment by boat traffic. As a result there are very few aquatic plants present. The canal is sheet piled within the survey area and marginal vegetation is limited to a thin strip under 1m wide where the vegetation is not mown for the tow path.

Vegetation communities present

- 5.4.271 The northern bank is more open and less-shaded than the southern bank. The narrow vegetation community that has established along the northern edge of the canal covers approximately 80% of the bank and is 1-2m in height. Meadowsweet is abundant, with cow parsley, gypsywort, common nettle and broad buckler fern also frequently recorded. Other locally abundant species include hemp agrimony (*Agrimonia eupatoria*), yellow iris, skullcap and marsh woundwort. In areas of bank erosion reed sweet-grass is dominant species in the shallow canal edge. This vegetation community (Table 102) is M27a *Filipendula ulmaria*-*Angelica sylvestris* mire, *Urtica dioica*-*Vicia cracca* sub-community (MATCH coefficient of 44%), which is a community type that occurs throughout central, southern and eastern Britain.

Table 102: NVC frequency table for community found on the bank of the Trent and Mersey Canal near Fradley

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Alnus glutinosa</i>	-	-	5	-	3	II (3-5)
<i>Filipendula ulmaria</i>	9	8	1	10	5	V (1-10)
<i>Lycopus europaeus</i>	5	-	-	-	4	II (4-5)
<i>Angelica sylvestris</i>	-	-	-	1	3	II (1-3)
<i>Urtica dioica</i>	-	-	3	3	-	II (3)
<i>Convolvulus arvensis</i>	-	2	2	-	-	II (2)
<i>Lotus pedunculatus</i>	-	-	2	-	2	II (2)
<i>Equisetum arvense</i>	-	-	-	2	1	II (1-2)
<i>Dryopteris dilatata</i>	-	1	-	1	-	II (1)
<i>Glyceria maxima</i>	-	-	8	-	-	I (8)
<i>Iris pseudacorus</i>	-	7	-	-	-	I (7)
<i>Epilobium hirsutum</i>	-	6	-	-	-	I (6)
<i>Eupatorium cannabinum</i>	-	-	5	-	-	I (5)
<i>Carex hirta</i>	-	-	-	4	-	I (4)
<i>Rubus fruticosus</i> agg.	-	4	-	-	-	I (4)
<i>Dryopteris filix-mas</i>	-	-	-	-	3	I (3)
<i>Hypericum tetrapterum</i>	-	-	-	-	3	I (3)
<i>Scutellaria galericulata</i>	3	-	-	-	-	I (3)
<i>Stachys palustris</i>	2	-	-	-	-	I (2)
<i>Anthriscus sylvestris</i>	-	-	1	-	-	I (1)
<i>Carex paniculata</i>	-	-	1	-	-	I (1)

- 5.4.272 Trees such as alder and silver birch extend right up to the water's edge on the southern bank, which has precluded any marginal vegetation from establishing.

Woodend Lock SBI (030-PH2-188001)

Site description and reasons for selection for survey

- 5.4.273 This site includes woodland (approximately 1ha) and a pond on the southern bank of the Trent and Mersey Canal at a bend in the canal near Woodend Lock. The woodland secondary in nature, is not classified as ancient woodland in the Natural England inventory. It is a Staffordshire SBI and has wet woodland, a Habitat of Principal Importance.
- 5.4.274 The pond is heavily shaded and lacking in marginal vegetation. This site is situated at the location where the Curborough Brook flows under the canal and sits upon superficial geological deposits of alluvial clay, silt sand and gravel that are present in the valley of the brook. The underlying bedrock is Mudstone. There are a number of

veteran pedunculate oak and mature ash trees present that are over 2m in diameter at breast height, and there is a very large white poplar up to 35m in height.

Vegetation communities present

- 5.4.275 There is a wet woodland community that surrounds the pond that is dominated by alder and ash, which is frequent in the canopy with constant species common nettle and ivy occasional hart's tongue fern (*Asplenium scolopendrium*) in the ground flora. Wetter depressions to the north-west of the pond contain crack willow up to 10m in height and large bitter-cress (*Cardamine amara*), which is locally abundant with ground ivy. This woodland community (Table 103) is W6a *Alnus glutinosa-Urtica dioica* woodland, typical sub-community (MATCH gave a relatively low coefficient of similarity of 33%), which is widespread but local throughout Britain on suitable damp soils.

Table 103: NVC frequency table for wet woodland at Woodend Lock

Species	Quadrat locations					Constancy (Domin range)
			Q1	Q2	Q3	
<i>Alnus glutinosa</i>			6	7	2	III (2-7)
<i>Salix fragilis</i>			-	2	9	II (2-9)
<i>Fraxinus excelsior</i>			7	-	-	I (7)
<i>Populus alba</i>				1	-	I (1)
<i>Urtica dioica</i>			10	9	-	II (9-10)
<i>Hedera helix</i>			4	2	-	II (2-4)
<i>Silene dioica</i>			1	2	-	II (1-2)
<i>Cardamine pratensis</i>			-	-	9	I (9)
<i>Glechoma hederacea</i>			-	-	4	I (4)
<i>Pteridium aquilinum</i>			4	-	-	I (4)
<i>Impatiens capensis</i>			-	-	1	I (1)

- 5.4.276 A drier woodland community is present on the steep banks to the north and east of the site and in the areas to the south and west away from the pond. In the east of the site, there is some neglected hazel coppice with mature ash standards, but the shrub layer is generally limited to more open areas, where there is bramble, elder and hawthorn. The understorey here is dominated by dog's mercury, with ivy and male fern. In the west and south of the site, pedunculate oak is more dominant in the canopy and hawthorn is more abundant in the shrub layer, along with frequent guelder rose. In the ground flora there is bracken, bluebell and common dog violet (*Viola riviniana*).
- 5.4.277 This woodland community (Table 104) was identified by the surveyor as W8d *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland, *Hedera helix* sub-community (despite unreliable MATCH results), due to the high abundance of dog's mercury in the ground flora. This is a common community of established woodlands on base-rich soils throughout the British lowlands.

Table 104: NVC frequency table for dry woodland community at Woodend Lock

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Corylus avellana</i>			10	7	3	III (3-10)
<i>Fraxinus excelsior</i>			4	8	-	II (4-8)
<i>Quercus robur</i>			-	-	9	I (9)
<i>Crataegus monogyna</i>			-	-	8	I (8)
<i>Sambucus nigra</i>			-	8	7	I (8)
<i>Viburnum opulus</i>			-	-	2	I (2)
<i>Rubus fruticosus</i> agg.			-	5	-	I (5)
<i>Mercurialis perennis</i>			9	8	-	II (8-9)
<i>Hedera helix</i>			6	3	-	II (3-6)
<i>Viola riviniana</i>			-	-	7	I (7)
<i>Dryopteris filix-mas</i>			-	5	-	I (5)
<i>Silene dioica</i>			-	4	-	I (4)
<i>Arctium lappa</i>			-	-	1	I (3)
<i>Circaea lutetiana</i>			-	-	3	I (3)
<i>Hyacinthoides non-scripta</i>			-	-	3	I (3)
<i>Viburnum opulus</i>			2	-	-	I (2)
<i>Dryopteris dilatata</i>			1	-	-	I (1)
<i>Pteridium aquilinum</i>			-	-	1	I (1)
<i>Urtica dioica</i>			1	-	-	I (1)

- 5.4.278 The pond in the centre of the site is entirely covered by duckweed, which forms the floating aquatic A2 *Lemna minor* community, which is widespread in lowland Britain in eutrophic waters. No other marginal or aquatic plants were associated with this community and the margins were heavily shaded by overhanging trees.

Ravenshaw Wood, Black Slough and Slaish SBI (030-PH2-188003, 030-PH2-189001)

Site description and reasons for selection for survey

- 5.4.279 Ravenshaw Wood, Black Slough and Slaish is a Staffordshire SBI and is recognised as lowland mixed deciduous woodland, a habitat of principal importance, and a part of Ravenshaw Wood and the north-western compartment known as Slaish are included within the Natural England inventory as ancient woodland. The remainder of the site is secondary woodland and former heathland or scrub, as indicated on the OS County Series map of Staffordshire from the 1880s⁴⁸.

⁴⁸ Ordnance Survey (1883-1887), County Series Map of Staffordshire, 1:2500 scale.

- 5.4.280 Ravenshaw Wood is situated approximately 4km north of Lichfield, on a broad plain alongside the Trent and Mersey Canal. The immediate surrounding landscape is of compartmentalised woodlands (some ancient) and arable fields bisected by the canal which is orientated north-west to south-east, but turns north east at Wood End Lock. The underlying bedrock is Mudstone overlaid with Superficial Glacial Deposits of sand and gravel. The soil appears to be sandy and variably waterlogged. The soil is noticeably quite acidic, and the vegetation communities present are typical of these soil conditions. Two or three drainage ditches cross the site.
- 5.4.281 Black Slough and Slaish is a block of woodland to the west of Ravenshaw Wood and connected to it via a strip of woodland alongside the southern bank of the Trent and Mersey Canal. It is situated in a similar landscape to Ravenshaw Wood and has similar underlying geology and soils. The north of the site (Slaish) is locally waterlogged.

Ravenshaw Wood (030-PH2-188003) – vegetation communities

- 5.4.282 The woodland has a rather open, even aged canopy of pedunculate oak, with abundant downy birch (*Betula pubescens*) in the gaps between the oaks. Other canopy trees are rare, apart from isolated groups of alder or Scots pine trees. The shrub layer is very open but for a few large amalgamations of mature rhododendron bushes, which have attained a height of up to 5m in places. Where rhododendron is present, it has excluded almost the entire ground flora beneath, but for a few moss species.
- 5.4.283 Other shrub species include rowan, and young downy birch or pedunculate oak. A few grey willow shrubs are present in waterlogged areas. The ground flora is dominated in large areas by a blanket covering of bracken, which at the time of the survey was over 1m in height. In the north, east and south of the site, shading or waterlogging reduces the dominance of bracken and there are patches where broad buckler-fern is abundant or bramble dominant. Bramble is present throughout the woodland at variable abundance, and other species occasionally recorded include creeping soft-grass, common nettle, climbing corydalis (*Ceratocarpus claviculata*) and honeysuckle. Common feather-moss, rough-stalked feather-moss (*Brachythecium rutabulum*), and swan's-neck thyme-moss are common in the damper areas of woodland.
- 5.4.284 This woodland community (Table 105) is *W10d Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Holcus lanatus* sub-community (MATCH coefficients of 57%) characteristic of open, often young, woods on base poor soils and widespread over the lowlands of England and Wales.

Table 105: NVC frequency table for dry woodland community at Ravenshaw Wood

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Betula pubescens</i>	8	7	8	9	8	V (7-9)
<i>Quercus robur</i>	5	6	4	4	-	IV (4-6)
<i>Pinus sylvestris</i>	-	4	-	-	-	I (4)
<i>Alnus glutinosa</i>	2	-	-	-	-	I (2)
<i>Rhododendron ponticum</i>	5	7	1	2	-	IV (1-7)
<i>Sorbus aucuparia</i>	1	-	-	2	1	III (1-2)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Betula pubescens</i> (young)	1	-	-	3	-	II (1-3)
<i>Salix cinerea</i>	-	-	-	-	1	I (1)
<i>Quercus robur</i> (young)	-	-	-	1	-	I (1)
<i>Rubus fruticosus</i> agg.	8	4	2	3	4	V (2-8)
<i>Kindbergia praelonga</i>	3	3	2	-	3	IV (2-3)
<i>Pteridium aquilinum</i>	7	-	10	-	9	III (7-10)
<i>Dryopteris dilatata</i>	1	-	-	9	4	III (1-9)
<i>Brachythecium rutabulum</i>	-	-	2	2	3	III (2-3)
<i>Rhododendron ponticum</i> (sucker)	4	-	-	-	-	I (4)
<i>Dicranum scoparium</i>	-	3	-	-	-	I (3)
<i>Mnium hornum</i>	-	-	-	3	-	I (3)
<i>Poa trivialis</i>	-	3	-	-	-	I (3)
<i>Urtica dioica</i>	-	3	-	-	-	I (3)
<i>Ceratocarpus claviculata</i>	-	-	-	2	-	I (2)
<i>Deschampsia flexuosa</i>	-	-	-	-	2	I (2)
<i>Holcus mollis</i>	-	2	-	-	-	I (2)
<i>Lonicera periclymenum</i>	2	-	-	-	-	I (2)
<i>Ranunculus repens</i>	-	2	-	-	-	I (2)
<i>Stellaria media</i>	-	2	-	-	-	I (2)

5.4.285 In the north-west of Ravenshaw Wood the woodland is on waterlogged ground. Here the canopy is similar to the rest of the wood, but there is a small area (less than 0.1 ha) where tussocks of purple moor-grass (*Molinia caerulea*) are prominent in the ground flora. Wavy hair-grass is also present, particularly on a boundary bank that marks the eastern edge of the wood. This woodland community (Table 106) is W_{4a} *Betula pubescens*-*Molinia caerulea* woodland, *Dryopteris dilatata*-*Rubus fruticosus* sub-community (MATCH coefficient of 45%), a widespread but locally occurring community of damp, acidic soils in the British lowlands.

Table 106: NVC frequency table for wet woodland community at Ravenshaw Wood

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Betula pubescens</i>					9	I (9)
<i>Quercus robur</i>					4	I (4)
<i>Rhododendron ponticum</i>					5	I (5)
<i>Molinia caerulea</i>					8	I (8)
<i>Deschampsia flexuosa</i>					4	I (4)

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Mnium hornum</i>					3	I (3)
<i>Rubus fruticosus</i> agg.					3	I (3)
<i>Dryopteris dilatata</i>					2	I (2)
<i>Pteridium aquilinum</i>					1	I (1)
<i>Rhododendron ponticum</i> (sucker)					1	I (1)

Black Slough and Slaish (030-PH2-189001) – vegetation communities

- 5.4.286 The central area of Black Slough has abundant even aged downy birch and frequent pedunculate oak in the canopy. Like Ravenshaw Wood, there are large stands of mature rhododendron bushes and areas with an open shrub layer and abundant bracken. In the north of the site, north of the track that goes to Ravenshaw Cottage the understorey is dominated by a dense tangle of rhododendron with one or two open glades. Other shrub species are present at very low relative abundance. Rowan is scattered throughout, and holly, birch and oak saplings are also present.
- 5.4.287 Bracken is locally abundant in the ground flora but does not attain the same cover as in Ravenshaw Wood. Bramble is also present throughout as a low sprawl. In glades with damper soil conditions, bracken is noticeably absent and bramble and broad buckler-fern dominate the ground flora. Other herbaceous species are very infrequent at the site. Soft rush, Yorkshire-fog, creeping soft-grass and lady fern (*Athyrium filix-femina*) are present only in isolated locations. Mosses are frequently found, covering the ground and fallen dead wood in patches. The species include common feather-moss, rough-stalked feather-moss, cypress-leaved plait-moss (*Hypnum cupressiforme*) and common smoothcap (*Atrichum undulatum*).
- 5.4.288 The majority of Black Slough is the woodland community (Table 107) W10d *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland, *Holcus lanatus* sub-community similar to Ravenshaw Wood (MATCH coefficient of 55%).

Table 107: NVC frequency table for dry woodland community at Black Slough

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Betula pubescens</i>	2	10	6	4	8	V (2-10)
<i>Quercus robur</i>	9	-	5	9	6	IV (5-9)
<i>Aesculus hippocastanum</i>	1	-	-	-	-	I (1)
<i>Betula pendula</i>	1	-	-	-	-	I (1)
<i>Ilex aquifolium</i>	1	-	-	-	-	I (1)
<i>Picea abies</i>	1	-	-	-	-	I (1)
<i>Prunus avium</i>	1	-	-	-	-	I (1)
<i>Rhododendron ponticum</i>	4	6	4	6	6	V (4-6)
<i>Sorbus aucuparia</i>	1	1	1	1	-	IV (1)

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Quercus robur</i> (sapling)	1	-	2	-	-	II (1-2)
<i>Sambucus nigra</i>	1	-	-	-	2	II (1-2)
<i>Ilex aquifolium</i>	-	-	1	-	1	II (1)
<i>Betula pubescens</i> (sapling)	-	-	2	-	-	I (2)
<i>Rubus fruticosus</i> agg.	1	2	9	2	8	V (1-9)
<i>Pteridium aquilinum</i>	9	2	6	-	-	III (2-9)
<i>Dryopteris dilatata</i>	1	1	-	6	-	III (1-6)
<i>Hypnum cupressiforme</i>	-	3	3	3	-	III (3)
<i>Polytrichum formosum</i>	3	-	-	3	-	II (3)
<i>Kindbergia praelonga</i>	-	2	3	-	-	II (2-3)
<i>Brachythecium rutabulum</i>	-	-	2	-	2	II (2)
<i>Rhododendron ponticum</i> (seedling)	-	-	-	2	1	II (1-2)
<i>Holcus mollis</i>	8	-	-	-	-	I (8)
<i>Atrichum undulatum</i>	-	-	-	3	-	I (3)
<i>Holcus lanatus</i>	3	-	-	-	-	I (3)
<i>Mnium hornum</i>	3	-	-	-	-	I (3)
<i>Athyrium filix-femina</i>	2	-	-	-	-	I (2)
<i>Juncus effusus</i>	-	-	-	-	2	I (2)
<i>Quercus robur</i> (seedling)	2	-	-	-	-	I (2)
<i>Galium aparine</i>	1	-	-	-	-	I (1)

- 5.4.289 Further north towards the canal, in the area known as Slaish, the ground conditions become very wet and the canopy changes to a low shrub layer of grey willow with scattered crack willow. Alder is present alongside the canal. Rhododendron is also present. There are small pools and raised areas forming a mosaic of wet and drier conditions. Stands of tall herbaceous plants such as yellow iris, lesser pond-sedge and soft rush are present, with patches of creeping soft-grass and red fescue in drier areas. Broad buckler-fern and male fern are scattered throughout. The most noticeable characteristic of this habitat are cushions of bog mosses, including blunt-leaved bog-moss (*Sphagnum palustre*) and spiky bog-moss (*Sphagnum squarrosum*). Bittersweet and marsh willowherb are also present.
- 5.4.290 This small area was identified by the surveyor as the woodland community (Table 108) W2b *Salix cinerea*-*Betula pubescens*-*Phragmites australis* woodland, *Sphagnum* spp. sub-community, despite unreliable MATCH results due to the small sample set. This is

an uncommon community in the Midlands, more often occurring in East Anglia, with local stands in Cheshire and Shropshire⁴⁹.

Table 108: NVC frequency table for wet woodland community at Slaish

Species	Quadrat locations					Constancy (Domin range)
					Q1	
<i>Betula pubescens</i>					6	I (6)
<i>Salix fragilis</i>					6	I (6)
<i>Salix cinerea</i>					4	I (4)
<i>Rhododendron ponticum</i>					4	I (4)
<i>Sphagnum palustre</i>					5	I (5)
<i>Carex acutiformis</i>					4	I (4)
<i>Iris pseudacorus</i>					4	I (4)
<i>Sphagnum squarrosum</i>					4	I (4)
<i>Carex pseudocyperus</i>					3	I (3)
<i>Dryopteris dilatata</i>					3	I (3)
<i>Holcus mollis</i>					3	I (3)
<i>Solanum dulcamara</i>					3	I (3)
<i>Juncus effusus</i>					2	I (2)
<i>Dryopteris filix-mas</i>					1	I (1)
<i>Epilobium palustre</i>					1	I (1)
<i>Festuca rubra</i> agg.					1	I (1)
<i>Rubus fruticosus</i> agg.					1	I (1)

John's Gorse SBI and Hanchwood House Woodlands (030-PH2-190001 to 030-PH2-190004)

Site description and reasons for selection for survey

- 5.4.291 This site includes three main woodland blocks and an area of scattered trees at Hanchwood House, Shaw Lane east of Longdon, Staffordshire. The two most northerly woodland blocks (030-PH2-190001 and 030-PH2-190003) form John's Gorse SBI (Staffordshire) which is ancient woodland on the Natural England inventory. The area of scattered trees is west of these blocks alongside the current Lichfield to Stafford rail line is also a remnant of former ancient woodland (including John's Gorse), known as Hanch Wood, which is present on the OS County Series map of Staffordshire from the 1880s⁵⁰. These woodlands are lowland mixed deciduous woodland habitat of principal importance.

⁴⁹ Rodwell, J.S. Ed. (1991), *British Plant Communities Volume 1: Woodlands and Scrub*. Cambridge University Press, Cambridge.

⁵⁰ Ordnance Survey (1883-1887), County Series Map of Staffordshire, 1:2500 scale.

- 5.4.292 South of John's Gorse is the third woodland block alongside Bourne Brook (030-PH2-190002). This woodland is wet woodland habitat of principal importance.
- 5.4.293 The most northerly woodland block of John's Gorse SBI is 0.6ha in size and unfenced to cattle. The larger more southerly woodland block of John's Gorse (also known as Fox Covert) is 1.8ha in size and has mature conifers and has the appearance of much disturbance in the past. Access to John's Gorse was not obtained for detailed survey and observations were made from the field boundary. However, detailed survey was undertaken in the woodland adjacent to Bourne Brook.

John's Gorse SBI (030-PH2-190001 and 030-PH2-190003) – vegetation communities

- 5.4.294 John's Gorse 2 (030-PH2-190003) is heavily grazed. The canopy consists mainly of oak and some birch, now dying back, above a grassy field layer. The very sparse understorey contains hawthorn, holly and sweet chestnut. Much fallen wood was visible below.
- 5.4.295 John's Gorse 1, which is also known as Fox Covert (030-PH2-190001), appears to have once been much larger and since reduced by felling and wayleave maintenance to accommodate an overhead power line. This woodland has been extensively planted with conifers, including Norway spruce (*Picea abies*), Scots pine and common larch. The canopy is open with relatively few mature broadleaved trees. Cherry and birch are present, but more than half the area consists of hawthorn and elder scrub, with some hazel. A more open area in the south-eastern corner of the wood had abundant bracken and gorse bushes visible at the edge.

Hanchwood House Woodland 2 (030-PH2-190004)

- 5.4.296 A relict area of ancient woodland is present to the west of John's Gorse SBI. This habitat is heavily grazed under a canopy of scattered pedunculate oak trees. Due to grazing pressure, there are very few characteristic woodland species present in the ground flora. This habitat was not considered to be a habitat of principal importance and was not surveyed for NVC communities.

Hanchwood House Woodland 1 adjacent to Bourne Brook (030-PH2-190002) – vegetation communities

- 5.4.297 This woodland has a canopy predominantly of even-aged, pedunculate oak with some conifers (probably planted approximately 50-60 years ago). There are a few older specimens of oak along the margins and a narrow belt of native alder alongside the stream, which also extends upstream towards the existing Lichfield to Stafford rail line. The ground conditions are very wet and subject to seasonal flooding in places. There is a closed canopy and rhododendron is dominant in the shrub layer, resulting in heavy shading of the ground flora. Indian balsam is abundant in this layer, and few other species are present. Along the upper, eastern woodland edge common shade-tolerant species such as lesser burdock, red campion, cleavers and foxglove were present. There was relatively little fallen dead wood and a few dead standing conifers. In the northern section of the wood there is a more free-draining soil and bluebell is abundant, with creeping soft-grass and some sparse dog's mercury. A single veteran field maple is present at the northern tip of the site, adjacent to a pond.

- 5.4.298 This woodland community (Table 109) is best described as W6d *Alnus glutinosa-Urtica dioica* woodland, *Sambucus nigra* sub-community although the presence of planted pedunculate oak reduces the similarity to the published NVC description of this community. MATCH gave a low coefficients of similarity for W6d 35% as a consequence. This is a widespread but localised community in lowland Britain, found on damp and periodically flooded sites.

Table 109: NVC frequency table for woodland alongside Bourne Brood at Hanchwood House

Species	Quadrat locations					Constancy (Domin range)
			Q1	Q2	Q3	
<i>Quercus robur</i>			9	9	9	III (9)
<i>Alnus glutinosa</i>			5	4	4	III (4-5)
<i>Picea abies</i>			-	4	4	II (4)
<i>Larix</i> sp.			-	4	-	I (4)
<i>Pinus nigra</i>			-	-	4	I (4)
<i>Rhododendron ponticum</i>			5	7	7	III (5-7)
<i>Sambucus nigra</i>			6	3	4	III (3-6)
<i>Hedera helix</i>			4	-	4	II (4)
<i>Symphoricarpos albus</i>			-	5	-	I (5)
<i>Ilex aquifolium</i>			-	-	4	I (4)
<i>Crataegus monogyna</i>			-	3	-	I (3)
<i>Impatiens glandulifera</i>			7	6	10	III (6-10)
<i>Silene dioica</i>			-	1	8	II (1-8)
<i>Dryopteris dilatata</i>			-	4	3	II (3-4)
<i>Hedera helix</i>			2	-	2	II (2)
<i>Rhododendron ponticum</i>			-	8	-	I (8)
<i>Rubus fruticosus</i> agg.			-	-	4	I (4)
<i>Crataegus monogyna</i> (seedling)			1	-	-	I (1)
<i>Urtica dioica</i>			-	-	1	I (1)

Trent and Mersey Canal, Handsacre (030-PH2-192001)

Site description and reasons for selection for survey

- 5.4.299 The Trent and Mersey Canal at Handsacre, Staffordshire includes eutrophic standing water, a habitat of principal importance. This section of the canal is turbid and heavily affected by disturbed silt (similar to the canal section at Fradley) and as a consequence has very few aquatic plants. The canal is sheet piled and marginal vegetation is limited to a thin strip under 1m wide where the vegetation is not mown for the tow path. Where trees extend right up to the canal edge there is little marginal vegetation. The vegetation on the northern bank is more developed as there is only light shading from adjacent woodland.

Vegetation communities present

- 5.4.300 The marginal vegetation community on the edge of the canal covers is between 1-2m in height. Meadowsweet is constant and often abundant with wild angelica, cow parsley, gypsywort, common nettle and broad buckler fern frequent. Other associated species that are occasional or locally abundant included hemp agrimony, yellow iris, skullcap and marsh woundwort. In areas of bank erosion reed sweet-grass is locally dominant. This vegetation community (Table 110) is M27b *Filipendula ulmaria*-*Angelica sylvestris* mire *Urtica dioica*-*Vicia cracca* sub-community (MATCH coefficient of 44%), which commonly occurs throughout central, southern and eastern Britain.

Table 110: NVC frequency table for Trent and Mersey Canal, Handsacre

Species	Quadrat locations					Constancy (Domin range)
	Q1	Q2	Q3	Q4	Q5	
<i>Alnus glutinosa</i>	-	-	5	-	3	II (3-5)
<i>Filipendula ulmaria</i>	9	8	1	10	5	V (1-10)
<i>Lycopus europaeus</i>	5	-	-	-	4	II (4-5)
<i>Urtica dioica</i>	-	-	3	3	-	II (3)
<i>Angelica sylvestris</i>	-	-	-	1	3	II (1-3)
<i>Equisetum arvense</i>	-	-	-	2	1	II (1-2)
<i>Convolvulus arvensis</i>	-	2	2	-	-	II (2)
<i>Lotus pedunculatus</i>	-	-	2	-	2	II (2)
<i>Dryopteris dilatata</i>	-	1	-	1	-	II (1)
<i>Glyceria maxima</i>	-	-	8	-	-	I (8)
<i>Iris pseudacorus</i>	-	7	-	-	-	I (7)
<i>Epilobium hirsutum</i>	-	6	-	-	-	I (6)
<i>Eupatorium cannabinum</i>	-	-	5	-	-	I (5)
<i>Carex hirta</i>	-	-	-	4	-	I (4)
<i>Rubus fruticosus</i> agg.	-	4	-	-	-	I (4)
<i>Dryopteris filix-mas</i>	-	-	-	-	3	I (3)
<i>Hypericum tetrapterum</i>	-	-	-	-	3	I (3)
<i>Scutellaria galericulata</i>	3	-	-	-	-	I (3)
<i>Stachys palustris</i>	2	-	-	-	-	I (2)
<i>Anthriscus sylvestris</i>	-	-	1	-	-	I (1)
<i>Carex paniculata</i>	-	-	1	-	-	I (1)

6 River habitat survey

6.1 Introduction

6.1.1 This section of the appendix presents details of River Habitat Survey⁵¹ (RHS) data, River Corridor Survey⁵² (RCS) data and Fish Habitat Survey (FHS) data⁵³ for the section of the Proposed Scheme that will pass through CFA16 to CFA22 inclusive.

6.2 Methodology

6.2.1 Details of the standard methodology utilised for RHS and RCS surveys are provided in the Ecology technical note: Ecological field survey methods and standards (Volume5: Appendix CT-001-000/2).

6.2.2 The FHS methodology has been devised to provide a fisheries habitat value for watercourse reaches. The survey method is based on the collection of field data relating to watercourse dimensions, flow and substrate character and habitat features for individual survey reaches. These are then used to assess habitat quality in terms of cover provided for juvenile coarse and salmonid species, habitat availability for spawning phytophilic and rheophilic coarse species and salmonids. Additional assessment measures include the presence of evidence of pollution and barriers/obstacles to fish migration. Based on these measures an overall FHS assessment quality for the watercourse is provided as follows:

- Good: Habitats include varying flow types to include rifles pools, runs, and glides. Substrate diversity is more complex and there is good cover to provide refuge for juvenile and adult fish (both in-stream and marginal vegetation). Substrate is present for spawning salmonids. No evidence of pollution or other degradation. No obvious barriers to upstream migration;
- Moderate: Habitats include a number of flow types throughout the survey reach. Limited substrate diversity. Sparse cover on either bank for both juvenile and adult fish. Lower in-stream and marginal vegetation diversity. Limited substrate present for spawning salmonids. No evidence of pollution, other degradation (e.g. poaching) may be present. Potential barriers to upstream migration present; and
- Poor: Habitats with minimal variation in flow types. Substrate diversity limited. No bankside/marginal cover for fish on either bank. In-stream and marginal (where present) typically limited to single dominating species. No substrate available for spawning salmonids. Watercourse may receive diffuse land based pollution (run off) and exhibit a high degree of other degradation such as poaching. Barriers to upstream migration (debris/man-made dams) present.

⁵¹ RHS is a system devised by the Environment Agency for assessing the character and habitat quality of rivers based on their physical structure. Environment Agency (2003), River Habitat Survey in Britain and Ireland. *Field Survey Guidance Manual: 2003*. Bristol.

⁵² River corridor survey is a method used to provide basic ecological information about a stretch of river and its accompanying bank. It involves the production of standardised maps of vegetation structure and channel morphology for 500m sections of river. National Rivers Authority (1992), *River Corridor Surveys: Methods and Procedures*. HMSO.

⁵³ Fish habitat survey methodology was devised by the EIAC to provide a measure of watercourse habitat quality for fish species groups and life stages with broadly different habitat requirements. Habitat quality for fish species groups and life stage is rated as either poor, moderate or good with an overall rating for the survey reach also provided.

- 6.2.3 In determining watercourse habitat quality the following desk study sources have been used where available:
- Environment Agency Water Framework Directive (WFD) assessment;
 - Environment Agency RHS data; and
 - Environment Agency aquatic macrophyte assemblage data and biological metrics used to assess watercourse habitat quality in terms of flow and nutrient status.
- 6.2.4 Watercourse types have been described as either main river (as designated by Defra and shown on Environment Agency main river maps) or ordinary watercourse (which includes all rivers, streams and drains not identified as main river under the control of an Internal Drainage Board (IDB) or lead local flood authority and canals.
- 6.2.5 Where available the name of the watercourse is provided. If the watercourse is unnamed it is identified as such and the name of the receiving tributary watercourse used as a descriptor e.g. unnamed tributary watercourse of the River Avon.
- 6.2.6 Some minor watercourses are not represented in the supporting Map Book series (Volume 5: Map Books – Ecology, Maps EC-10) due to the resolution at which these maps have been prepared. In such instances the corresponding Map Book reference is provided to assist in reader orientation, though the watercourse itself may not actually be visible.
- 6.2.7 A summary of locations at which RHS, RCS and FHS was undertaken within the section of the Proposed Scheme that will pass through CFA16 to CFA22 inclusive is provided in Table 111, and is shown in Volume 5: Map Books – Ecology, Maps EC-10.

Table 111: Summary of RHS, RCS and FHS survey locations for CFA16 to CFA22 inclusive

Ecology survey code	Watercourse	Feature type	Survey date	CFA	Distance from the Proposed Scheme (m) and orientation
030-RS1-129001	Grand Union Canal	Canal	22 August 2012	CFA17	Within land required – watercourse will be crossed by Longhole viaduct (Volume 5: Map Books – Ecology, Map EC-10-088; H6).
030-RS1-129002			21 August 2012		
030-RS2-129001			15 May 2013		
030-RS2-129002			15 May 2013		
030-FH1-129001			15 May 2013		
030-RS1-132001	Unnamed tributary watercourse of the River Leam	Ordinary watercourse	7 May 2013	CFA17	Within land required – watercourse will be crossed by Ash Beds culvert (Volume 5: Map Books – Ecology, Map EC-10-090; H7).
030-RS2-132001					
030-FH1-132001					
030-RS1-133001	River Leam	Main river	7 May 2013	CFA17	Within land required – watercourse will be crossed by River Leam viaduct (Volume 5: Map Books – Ecology, Map EC-10-090; B6).
030-RS2-133001					
030-FH1-133001					

Ecology survey code	Watercourse	Feature type	Survey date	CFA	Distance from the Proposed Scheme (m) and orientation
030-RS1-138001	River Avon	Main river	20 August 2012	CFA18	Within land required – watercourse will be crossed by River Avon viaduct (Volume 5: Map Books – Ecology, Map EC-10-094; A6).
030-RS1-138002			20 August 2012		
030-RS1-138003			20 August 2012		
030-RS1-139001			20 August 2012		
030-RS1-139002			20 August 2012		
030-RS2-138001			13 May 2013		
030-RS2-138002			13 May 2013		
030-RS2-138003			13 May 2013		
030-RS2-139001			13 May 2013		
030-FH1-138001			14 May 2013		
030-FH1-139001			15 August 2012		
030-RS1-141001	Finham Brook	Main river	9 May 2013	CFA18	Within land required – watercourse will be crossed by Finham Brook viaduct (Volume 5: Map Books – Ecology, Map EC-10-095; A6).
030-RS2-141001					
030-FH1-141001					
030-RS1-142001	Canley Brook	Main river	8 May 2013	CFA18	Within land required – watercourse will be crossed by Canley Brook viaduct (Volume 5: Map Books – Ecology, Map EC-10-096; C6).
030-RS1-142002					
030-RS2-142001					
030-RS2-142002					
030-FH1-142001					
030-FH1-142002					
030-RS1-145001	Unnamed tributary watercourse of the Canley Brook	Ordinary watercourse	9 May 2013	CFA18	Within land required – watercourse will be crossed by Proposed Scheme culvert (Volume 5: Map Books – Ecology, Map EC-10-098; G7).
030-RS2-145001					
030-FH1-145001					
030-RS1-162001	River Cole	Main river	14 May 2013	CFA19	Within land required – current river alignment crossed by the route (Volume 5: Map Books – Ecology, Map EC-10-109; B6).
030-RS2-162001					
030-RS2-162002					
030-FH1-162001					
030-RS1-164001	River Tame	Main river	21 August 2012	CFA19 and CFA20	Within land required – watercourse will be crossed by viaduct array (Volume 5: Map Books – Ecology, Map EC-10-111; C4).
030-RS1-164002			21 August 2012		
030-RS2-164001			3 June 2013		
030-RS2-164002			3 June 2013		
030-FH1-164001			3 June 2013		

Ecology survey code	Watercourse	Feature type	Survey date	CFA	Distance from the Proposed Scheme (m) and orientation
030-RS1-167001	Birmingham and Fazeley Canal	Canal	22 August 2012	CFA20	Within land required – watercourse will be crossed by Birmingham and Fazeley Canal viaduct (Volume 5: Map Books – Ecology, Map EC-10-113; I5).
030-RS1-167002			22 August 2012		
030-RS1-168001			22 August 2012		
030-RS2-167001			1 July 2013		
030-RS2-167002			1 July 2013		
030-RS2-167003			1 July 2013		
030-FH1-167001			1 July 2013		
030-RS1-171001	Langley Brook	Ordinary watercourse	10 May 2013	CFA20	Within land required – watercourse will be crossed by Langley Brook viaduct (Volume 5: Map Books – Ecology, Map EC-10-115; E6).
030-RS2-171001					
030-FH1-171001					
030-RS1-172001	Gallows Brook	Ordinary watercourse	13 May 2013	CFA20 and CFA21	Within land required – watercourse will be crossed by Proposed Scheme culvert (Volume 5: Map Books – Ecology, Map EC-10-116; G6).
030-RS1-172002					
030-RS2-172001					
030-RS2-172002					
030-FH1-172001					
030-RS1-173001	Unnamed tributary watercourse of the Tame	Ordinary watercourse	13 May 2013	CFA21	Within land required – watercourse will be crossed by Drayton Basset viaduct (Volume 5: Map Books – Ecology, Map EC-10-116; C6).
030-RS1-173002					
030-RS2-173001					
030-FH1-173001					
030-RS1-177004	Black Brook	Main river	14 May 2013	CFA21	Within land required – watercourse will be crossed by Black Brook viaduct (Volume 5: Map Books – Ecology, Map EC-10-120; B6).
030-RS1-177005			14 May 2013		
030-RS1-173006			14 May 2013		
030-RS2-177002			14 May 2013		
030-RS2-177003			14 May 2013		
030-RS2-177004			14 May 2013		
030-FH1-177002			14 May 2013		
030-RS1-177003	Unnamed tributary watercourse of the Black Brook	Ordinary watercourse	14 May 2013	CFA21	Adjacent to land required – 200m west of the route (Volume 5: Map Books – Ecology, Map EC-10-120; A8).
030-RS2-177001					
030-FH1-177001					
030-RS1-183002	Wyrley and Essington Canal (east of crossing only)	Canal	16 May 2013	CFA22	Within land required – watercourse will be crossed by Cappers Lane viaduct (Volume 5: Map Books – Ecology, Map EC-10-124; C6).
030-RS2-183001			15 May 2013		
030-FH1-183001			15 May 2013		

Ecology survey code	Watercourse	Feature type	Survey date	CFA	Distance from the Proposed Scheme (m) and orientation
030-RS1-184001	Coventry Canal	Canal	16 May 2013	CFA22	Within land required – 150m east of the route (Volume 5: Map Books – Ecology, Map EC-10-125; F4).
030-RS2-184001			15 May 2013		
030-FH1-184001			15 May 2013		
030-RS1-186001	Unnamed tributary watercourse of Mare Brook	Ordinary watercourse	15 May 2013	CFA22	Within land required – current river alignment crossing (Volume 5: Map Books – Ecology, Map EC-10-126; D4).
030-RS1-186002			15 May 2013		
030-RS2-186001			15 May 2013		
030-RS2-186002			15 May 2013		
030-FH1-184002			15 May 2013		
030-RS1-188001	Trent and Mersey Canal	Canal	16 May 2013	CFA22	Within land required – watercourse will be crossed by viaduct array (Volume 5: Map Books – Ecology, Map EC-10-127; C6).
030-RS1-188002			16 May 2013		
030-RS1-188003			16 May 2013		
030-RS1-188004			16 May 2013		
030-RS1-188005			16 May 2013		
030-RS2-188001			15 May 2013		
030-RS2-188002			15 May 2013		
030-RS2-188003			15 May 2013		
030-RS2-188004			15 May 2013		
030-RS2-188005			15 May 2013		
030-FH1-188001			15 May 2013		
030-RS1-188006	Curborough Brook	Main river	17 May 2013	CFA22	Within land required – watercourse will be crossed by Pyford Brook viaduct (Volume 5: Map Books – Ecology, Map EC-10-127; B6).
030-RS2-188006			17 May 2013		
030-FH1-188002			17 May 2013		
030-RS1-190001	Bourne Brook	Ordinary watercourse	17 May 2013	CFA22	Within land required – watercourse will be crossed by Bourne Brook viaduct (Volume 5: Map Books – Ecology, Map EC-10-129; F7).
030-RS2-190001			17 May 2013		
030-FH1-190001			17 May 2013		

6.3 Deviations, constraints and limitations

- 6.3.1 RHS, RCS and FHS data for watercourses reaches are presented in combination. When considered together, these measures provide a more robust assessment of the importance and conservation interest of the watercourse through consideration of both the habitats supported and wider river corridor characteristics.
- 6.3.2 Where the extent of watercourse screened as requiring survey did not align directly with the prescribed extent for full RHS/RCS (500m sections), the survey was extended/reduced to the nearest 500m.

6.3.3 Where access constraints were subsequently identified on site, the maximum possible extent of surveyable watercourse was assessed. In some instances this meant that less than the full 500m prescribed for RHS and RCS was actually surveyed. However this is considered to provide an appropriate proxy for the assessment of habitats present.

6.3.4 A summary of locations where requirement for RHS, RCS and FHS were identified but no/inadequate access available for survey is provided as Table 112.

Table 112: Summary of locations in CFA16 to CFA22 inclusive where requirement for RHS, RCS and FHS identified but no access available for survey

Watercourse	Location	OS grid reference – Start and finish	Feature type and comments	CFA	Distance from the Proposed Scheme (m) and orientation
Oxford Canal	Wormleighton	SP 44529 55339 to SP 45457 54769	Canal – no access to watercourse length requiring survey during available survey window.	CFA16	Within land required – watercourse will be crossed by Oxford Canal viaduct (Volume 5: Map Books – Ecology, Map EC-10-080; A4).
Unnamed tributary watercourse of the River Itchen	Radbourn	SP 44320 56537 to SP 44394 56541	Ordinary watercourse – no access to watercourse length requiring survey.	CFA16	Within land required – watercourse will be crossed by Lower Radbourn South viaduct (Volume 5: Map Books – Ecology, Map EC-10-081; C6).
Unnamed tributary watercourse of the River Itchen	Ladbroke	SP 43301 58657 to SP 42775 58348	Ordinary watercourse- inadequate access to watercourse length precluded undertaking survey to prescribed methodology.	CFA16	Within land required – watercourse will be crossed by Proposed Scheme culvert (Volume 5: Map Books – Ecology, Map EC-10-083; H5).
Unnamed tributary watercourse of the River Itchen	Southam	SP 39768 61602 to SP 40059 61465	Ordinary watercourse – no access to watercourse length requiring survey.	CFA16	Within land required – 100m west of the route (Volume 5: Map Books – Ecology, Map EC-10-085; B6).
River Itchen	Radbourn/ Southam	SP 44210 56956 to SP 43725 56781; and SP 40028 61369 to SP 40358 61623	Ordinary watercourse – no access to Radbourn watercourse length requiring survey. Inadequate access in Southam watercourse length precluded undertaking survey to prescribed methodology.	CFA16	Within land required – watercourse will be crossed in Radbourn by Lower Radbourn North viaduct (Volume 5: Map Books – Ecology, Map EC-10-082; I7) and in Southam realigned and crossed by the River Itchen viaduct (Volume 5: Map Books – Ecology, Map EC-10-086; J5).
Unnamed tributary watercourse of the River Leam	Offchurch	SP 38665 63985 to SP 37854 63858	Ordinary watercourse – inadequate access to watercourse length precluded undertaking survey to prescribed methodology.	CFA16 and CFA17	Within land required – watercourse will be crossed by Longhole (Grand Union Canal) viaduct (Volume 5: Map Books – Ecology, Map EC-10-087; B7).

Watercourse	Location	OS grid reference – Start and finish	Feature type and comments	CFA	Distance from the Proposed Scheme (m) and orientation
Unnamed tributary watercourse of the River Avon	Stoneleigh	SP 31465 72074 to SP 31682 71943	Ordinary watercourse – inadequate access to watercourse length precluded undertaking survey to prescribed methodology.	CFA18	Within land required – 510m west of the route (Volume 5: Map Books – Ecology, Map EC-10-094; A10).
River Cole	Coleshill	SP 18940 87814 to SP 18849 88379	Main river – inadequate access to continuous watercourse length precluded undertaking survey to prescribed methodology.	CFA19	Within land required-50m west of the route (Volume 5: Map Books – Ecology, Map EC-10-109; G7).
Unnamed tributary watercourse of the River Cole	Coleshill	SP 19562 86968 to SP 18994 87903	Ordinary watercourse-no access to watercourse length requiring survey.	CFA19	Within land required – watercourse will be crossed by Coleshill West viaduct (Volume 5: Map Books – Ecology, Map EC-10-109; G6) and Birmingham Spur up viaduct B-161-L5.
Unnamed tributary watercourse of the River Cole	Coleshill	SP 19568 87758 to SP 18961 88256	Main river which – no access to watercourse length requiring survey.	CFA19	Within land required – watercourse will be crossed by Coleshill West viaduct (Volume 5: Map Books – Ecology, Map EC-10-109; E6) and Birmingham Spur up viaduct B-161-L5.
River Cole	Coleshill	SP 18653 88932 to SP 19251 89550	Main river – inadequate access to continuous watercourse length precluded undertaking survey to prescribed methodology.	CFA19	Within land required – current river alignment crossed by the route (Volume 5: Map Books – Ecology, Map EC-10-109; B6).
Unnamed tributary watercourse of the Langley Brook	Curdworth	SP 19088 95176 to SP 19342 95376	Ordinary watercourse – no access to watercourse length requiring survey.	CFA20	Within land required – watercourse will be crossed by Cuttle Mill Underbridge (Volume 5: Map Books – Ecology, Map EC-10-113; F5).
Unnamed tributary watercourse of the Langley Brook	Middleton	SP 18630 96178 to SP 19227 96071	Ordinary watercourse-no access to watercourse length requiring survey.	CFA20	Within land required – watercourse will be crossed by North Wood Underbridge (Volume 5: Map Books – Ecology, Map EC-10-113; B6).
Unnamed tributary watercourse of the Langley Brook	Middleton	SP 18702 96528 to SP 19414 96624	Ordinary watercourse – no access to watercourse length requiring survey.	CFA20	Within land required – watercourse will be crossed by Hunts Green underbridge (Volume 5: Map Books – Ecology, Map EC-10-114; F6).

Watercourse	Location	OS grid reference – Start and finish	Feature type and comments	CFA	Distance from the Proposed Scheme (m) and orientation
Unnamed tributary watercourse of the Tame	Drayton Bassett	SK 16744 00184 to SP 17668 99620	Ordinary watercourse-no access to watercourse length requiring survey.	CFA21	Within land required – watercourse will be crossed by Drayton Bassett viaduct (Volume 5: Map Books – Ecology, Map EC-10-116; C6).
Unnamed tributary watercourse of the Bourne Brook	Lower Bangley	SK 15854 01525 to SK 16109 01949	Ordinary watercourse – inadequate access to watercourse length precluded undertaking survey to prescribed methodology.	CFA21	Within land required – watercourse will be crossed by Proposed Scheme culvert (Volume 5: Map Books – Ecology, Map EC-10-118; D6).
Wyrley and Essington Canal	Whittington	SK 14505 09051 to SK 14974 09321	Canal – surveys undertaken where suitable access available. No surveys access between SK 14505 09051 and SK 14796 09179.	CFA22	Within land required – watercourse will be crossed by Cappers Lane viaduct (Volume 5: Map Books – Ecology, Map EC-10-124; C6).
Unnamed tributary watercourse of Fisherwick Brook	Whittington	SK 14367 08885 to SK 14974 09242	Ordinary watercourse – inadequate access to watercourse length precluded undertaking survey to prescribed methodology.	CFA22	Within land required – watercourse will be crossed by Cappers Lane viaduct (Volume 5: Map Books – Ecology, Map EC-10-124; D6).
Unnamed tributary watercourse of Mare Brook	Whittington	SK 14034 09637 to SK 14931 09935	Main river-no access to watercourse length requiring survey.	CFA22	Within land required – watercourse will be crossed by Fulfen Wood culvert (Volume 5: Map Books – Ecology, Map EC-10-125; G6).
Mare Brook	Lichfield	SK 13914 11255 to SK 14646 11137	Ordinary watercourse – No access to watercourse length requiring survey.	CFA22	Within land required – watercourse will be crossed by Proposed Scheme culvert (Volume 5: Map Books – Ecology, Map EC-10-126; H3)

6.4 Baseline

- 6.4.1 Available Environment Agency aquatic invertebrate, fish and macro-invertebrate data is reported in Volume 5: Appendix EC-004-003.

CFA16 Ladbroke and Southam

Desk study

- 6.4.2 There are no main rivers within 100m of land required for the construction of the Proposed Scheme in this area.
- 6.4.3 Other watercourses within 100m of land required for the construction of the Proposed Scheme include the River Itchen, Oxford Canal and a number of unnamed tributary watercourses of the River Itchen and River Leam.
- 6.4.4 The following watercourses are crossed by the route of the Proposed Scheme:

- Oxford Canal;
- River Itchen;
- two unnamed tributary watercourses of the River Itchen (Volume 5: Map Books – Ecology, Map EC-10-081; C6 and Volume 5: Map Books – Ecology, Map EC-10-083; H5); and
- unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-087; B7).

6.4.5 There are two other watercourses within 100m of the land required for the construction of the Proposed Scheme that are not crossed by the route:

- unnamed tributary watercourse of the River Itchen (Volume 5: Map Books – Ecology, Map EC-10-081; H7, 60m east of the route); and
- unnamed tributary watercourse of the River Itchen (Volume 5: Map Books – Ecology, Map EC-10-085; B6, 100m west of the route).

6.4.6 Two watercourses within this area have been assessed as WFD water bodies within the Severn District River Basin Management Plan (RBMP). Specific information regarding the assessment of ecological elements is provided in Table 113.

6.4.7 Full information on the WFD status of assessed water bodies (including canals) is provided in the Water Resources and Flood Risk Assessment chapter for this area.

Table 113: WFD ecological element assessment for CFA16

Watercourse	WFD water body name	WFD water body ID	Morphological designation	Ecological element assessed and status/potential
Oxford Canal	Oxford Canal, summit pound	GB70910196	AWB	<i>Good potential</i> No biology sites
River Itchen	R Itchen – source to conf with R Stowe	GB109054044070	Not designated AWB/HMWB	<i>Moderate status</i> Macro-invertebrates – moderate Dissolved Oxygen – moderate Phosphate – moderate

Notes: WFD = Water Framework Directive, AWB = Artificial Water body, HMWB = Heavily Modified Water body

6.4.8 The Oxford Canal is already assessed at good ecological potential; the River Itchen has the objective of achieving good ecological status by 2027.

6.4.9 No Environment Agency RHS survey data are available for the WFD water bodies in this area, although the Oxford Canal is classified as an artificial water body (AWB).

6.4.10 No Environment Agency aquatic ecological survey data is available for the Oxford Canal (GB70910196) although it is classified as having good ecological potential under the WFD.

6.4.11 Environment Agency aquatic ecological data is available for the River Itchen only. Macrophyte data collected in 2010 on the River Itchen at Deppers Bridge (2.6km

upstream of the River Itchen viaduct crossing (Volume 5: Map Books – Ecology, Map EC-10-086; J5)) is reported in Table 114.

Table 114: Environment Agency aquatic macrophyte data by WFD water body for CFA16

Watercourse	WFD water body ID	Site name (Site ID) and NGR	Period of record (No. of records)	Details of most recent survey
River Itchen	GB109054044 070	Deppers Bridge (52226) SP 40000 59300	9 July 2010 (1)	Site located 2.6km upstream of route crossing. MTR: 31.8; MFR: 1.73; RMNI: 7.8; RMHI: 7.78; N_ATAXA_R: 5; N_RFG: 5

Notes: WFD= Water Framework Directive, MTR = Mean Trophic Rank⁵⁴, MFR = Mean Flow Rank⁵⁵, RMNI = River Macrophyte Nutrient Index⁵⁶, RMHI = River Macrophyte Hydraulic Index⁵⁶, N_ATAXA_R = Number of Aquatic Taxa⁵⁶, N_RFG = Number of Functional River Groups⁵⁶

6.4.12 Environment Agency macrophyte survey data for the River Itchen indicates the presence an assemblage of low species richness, characteristic of high nutrient and slow flowing conditions.

Survey data

6.4.13 The following watercourses within this area were identified as requiring RCS, RHS and FHS:

- Oxford Canal;
- unnamed tributary watercourse of the River Itchen (Volume 5: Map Books – Ecology, Map EC-10-081; C6);
- River Itchen;
- unnamed tributary watercourse of the River Itchen (Volume 5: Map Books – Ecology, Map EC-10-083; H5);
- unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-087; B7); and
- unnamed tributary watercourse of the River Itchen (Volume 5: Map Books – Ecology, Map EC-10-085; B6, 100m west of the route).

6.4.14 No access to the required survey areas has been obtained.

6.4.15 None of the watercourses within 100m of the land required for the construction of the Proposed Scheme in this area have statutory designations.

6.4.16 Rivers and streams are identified as habitats of principal importance. The Warwickshire, Coventry and Solihull Local Biodiversity Action Plan (BAP) lists rivers and streams as priority habitats and their aims regarding these include: ensuring the quality of watercourses and their corridors do not deteriorate; and enhancing those watercourses supporting species of principal importance or Red Data Book species.

⁵⁴ Holmes, N. T. H., Newman, J.R., Chadd, S. Rouen, K.J., Saint, L. and Dawson, F.H. (1999), *Mean Trophic Rank: A User's manual*. R & D Technical Report E38, Environment Agency, Bristol.

⁵⁵ Soley, R., Akande, K., Quinn, S., Holmes, N. and Solomon, D. (2002), *Resource Assessment and Management Framework Report and User Manual (Version 3)*. Environment Agency R&D Technical Manual W6-066M. Environment Agency, Bristol, UK.

⁵⁶ Willby, N.J., Pitt, J.A. and Phillips, G. (2009), *Development of a system for the classification of lakes and rivers in the UK using aquatic macrophytes*. Part II. Rivers. Environment Agency Science Report.

- 6.4.17 In the absence of survey data, those watercourses identified as requiring survey are broadly described based on a review of OS mapping and aerial photography.
- 6.4.18 The Oxford Canal is artificial and, in the vicinity of the route crossing, flows through predominantly arable land with a semi-continuous riparian buffer. It is thus likely to support only limited range of habitats.
- 6.4.19 The unnamed tributary watercourses of the River Itchen (Volume 5: Map Books – Ecology, Map EC-10-081; C6 and Map EC-10-085; B6) have been largely re-aligned and straightened through those reaches crossed by and adjacent to the Proposed Scheme. These watercourses sit within a predominantly arable catchment, but appear to have well developed semi-continuous riparian buffers. They are likely to support only limited range of in-channel and riparian habitats.
- 6.4.20 The unnamed tributary watercourse of the River Itchen (Volume 5: Map Books – Ecology, Map EC-10-083; H5) has broadly similar characteristics to the aforementioned tributaries of the River Itchen. However the watercourse also flows through an area of lowland deciduous woodland (Ladbroke Fox Covert) and exhibits a more sinuous planform likely to support a greater diversity of in-channel and riparian habitats.
- 6.4.21 The River Itchen is crossed at two separate locations by the Proposed Scheme. It varies in character throughout those reaches crossed by and adjacent to the route. Within the area of land required for construction of the Proposed Scheme, the river flows through predominantly arable land and grazing pasture. Both re-aligned and straightened sections are apparent from OS maps, in addition to more sinuous reaches likely to support a range of habitats. The riparian buffer apparent from aerial photography is semi-continuous. The heterogeneity in planform and associated riparian features within the Itchen are likely to support a range of of in-channel and riparian habitats.
- 6.4.22 The unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-087; B7) has been straightened and re-aligned throughout the reach crossed by and adjacent to the Proposed Scheme, largely conforming to the planform of the adjacent Grand Union Canal. It is also crossed by the existing Longhole Bridge and Welsh Road Bridge in this area where it will have been further modified and/or reinforced with artificial materials. Slightly greater sinuosity is evident through a riparian buffer strip that widens to a small copse separating the watercourse from the Grand Union Canal. It is likely to support only limited range of of in-channel and riparian habitats.

CFA17 Offchurch and Cubbington

Desk study

- 6.4.23 The River Leam is the only main river within 100m of the land required for the construction of the Proposed Scheme in this area.
- 6.4.24 Other watercourses within 100m of the land required for the construction of the Proposed Scheme include the Grand Union Canal, three unnamed tributary watercourses of the River Leam and two unnamed tributary watercourses of the River Avon.

- 6.4.25 Within this area the following watercourses are crossed by the route of the Proposed Scheme:
- unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-087; B7);
 - Grand Union Canal;
 - unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-090; H7); and
 - River Leam.
- 6.4.26 Watercourses within 100m of the land required for the construction of the Proposed Scheme that are not crossed by the route:
- one tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-089; C7, 255m west of the route); and
 - two tributary watercourses of the River Avon (Volume 5: Map Books – Ecology, Map EC-10-092; D4, 350m east and Map EC-10-092; B10, 400m west of the route).
- 6.4.27 In addition to crossings by the route, there are a number of road diversions and footpaths across the following watercourses:
- Hunningham Road crossing of an unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-089; A6 (360m west of the route));
 - Hunningham Road crossings of an unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-089; H6 (120m east of the route) and Volume 5: Map Books – Ecology, Map EC-10-089; H6 (40m west of the route)); and
 - footpath crossing of an unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-089; A5 (160m east of the route)).
- 6.4.28 A Water Framework Directive assessment has been undertaken in conjunction with the environmental assessment. Details of this assessment are presented in Volume 5: Appendix WR-001-000.
- 6.4.29 Two WFD assessed water bodies within the Severn District River Basin Management Plan (RBMP) fall within this area; namely the River Leam and Grand Union Canal. Specific information regarding their assessment is provided in Table 115.

Table 115: WFD ecological element assessment for CFA17

Watercourse	WFD water body name	WFD water body ID	Morphological designation	Ecological element assessed and status/potential
River Leam	River Leam – conf R Itchen to conf R Avon	GB109054044140	Not designated AWB/HMWB	<i>Moderate Status</i> Fish – good Invertebrates – good
Grand Union Canal	Grand Union Canal, Braunston to Leamington Spa	GB70910511	AWB	<i>Good Potential</i> No biology sites

Notes: WFD = Water Framework Directive, AWB = Artificial Water Body, HMWB = Heavily Modified Water Body

- 6.4.30 Under the WFD the River Leam has the objective of achieving good ecological status by 2027 and its current status is limited by phosphorous. The Grand Union Canal already achieves good ecological potential.
- 6.4.31 No Environment Agency RHS survey data is available for either of the two WFD water bodies. No Environment Agency aquatic ecological survey data is available for the Grand Union Canal.
- 6.4.32 Environment Agency macrophyte survey data (2011) is available for three sites on the River Leam (Table 116).

Table 116: Environment Agency aquatic macrophyte data by WFD water body for CFA17

Watercourse	WFD water body ID	Site name (Site ID) and NGR	Period of record (No. of records)	Details of most recent survey
River Leam	GB109054044140	D/S Rd Br, Offchurch (157346) SP 35784 66138	1 November 2011 (1)	Site located 2.15km –downstream of route crossing. MTR: 34.2; MFR: 1.7; RMNI: 8.23; RMHI: 8.28; N_ATAXA_R: 8; N_RFG: 6
		Hunningham Bridge (51122) SP 37270 68450	1 November 2011 (1)	Site located 2.26km – upstream of route crossing. MTR: 38.9; MFR: 2.18; RMNI: 7.84; RMHI: 7.71; N_ATAXA_R: 13; N_RFG: 9
		U/S B4455 Rd Br (157348) SP 39860 69872	1 November 2011 (1)	Site located 7.40km – upstream of route crossing. MTR: 33.3; MFR: 1.85; RMNI: 8.17; RMHI: 8.18; N_ATAXA_R: 10; N_RFG: 8

Notes: WFD = Water Framework Directive, MTR = Mean Trophic Rank⁵⁷, MFR = Mean Flow Rank, RMNI = River Macrophyte Nutrient Index, RMHI = River Macrophyte Hydraulic Index, N_ATAXA_R = Number of Aquatic Taxa⁵⁶, N_RFG = Number of Functional River Groups

- 6.4.33 The data show the aquatic plant communities to be characteristic of lowland stream systems with high nutrient loading (RMNI > 7.5 at all survey sites).

Survey data

- 6.4.34 The following four watercourses within this area were identified as requiring RHS, RCS and FHS:

⁵⁷ Holmes, N. T. H., Newman, J.R., Chadd, S. Rouen, K.J., Saint, L. and Dawson, F.H. (1999), *Mean Trophic Rank: A User's manual*. R & D Technical Report E38, Environment Agency, Bristol.

- unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-087; B7);
- Grand Union Canal;
- unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-090; H7); and
- River Leam.

6.4.35 Available RHS, RCS and FHS data are presented in Table 117.

6.4.36 No access has been obtained to survey the unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-087; B7) as described in Table 112.

Table 117: Summary of habitat survey results for watercourses (including canals) for CFA17

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
Grand Union Canal (Canal)	030-RS1-129001 (22 August 2012) 030-RS1-129002 (21 August 2013)	RCS	Complete	<p>030-RS1-129001 – (SP 38080 63950 to SP 37600 63880)</p> <p>A man-made, navigable water body with artificial banks and flow impounded by locks. Tow-path present and lined throughout by mature and semi-mature trees. The only aquatic macrophytes present were sparse emergent herbs and marginal reed/grass beds on the left bank. The reed and grass species included branched bur-reed (<i>Sparganium erectum</i>), common reed (<i>Phragmites australis</i>), reed sweet-grass (<i>Glyceria maxima</i>), reed canary-grass (<i>Phalaris arundinacea</i>), and common reedmace (<i>Typha latifolia</i>). Emergent plants were isolated but included the species great willowherb (<i>Epilobium hirsutum</i>), arrowhead (<i>Sagittaria sagittifolia</i>) and the non-native species orange balsam (<i>Impatiens capensis</i>).</p> <p>Proposed crossing point within this survey reach. At proposed crossing point the watercourse habitat and biotypes are typical of survey reach, with trees and shrubs on both banks.</p> <p>030-RS1-129002 – (SP 38700 64050 to SP 38070 63950)</p> <p>A man-made, navigable water body with artificial banks and flow impounded by locks. Tow-path present and lined throughout by mature and semi-mature trees. Aquatic macrophytes recorded included patches of rooted floating-leaved plants, sparse emergent herbs and marginal reed/grass beds on both banks. The yellow water-lily (<i>Nuphar lutea</i>) was present in small patches throughout the survey length. The reed and grass species included common club-rush (<i>Schoenoplectus lacustris</i>), branched bur-reed, reed sweet-grass and reed canary-grass. Emergent plants were isolated but included the species water mint (<i>Mentha aquatica</i>), great willowherb, arrowhead and the non-native species orange balsam.</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
	030-RS2-129001 (15 May 2013) 030-RS2-129002 (15 May 2013)	RHS	Complete	<p><i>030-RS2-129001 – (SP 38675 64024 to SP 38144 63964)</i></p> <p>HMS: 6454; HMC: 5; HQA: 23</p> <p>Wetted width: 13m</p> <p>Water depth: 0.75m</p> <p>Extensive resectioning and reinforcement of banks and channel, as well as a bridge, a lock and extensive embankments contribute to a high HMS of 6454, indicating a severely modified physical habitat structure. No substrate or flow variation was recorded, although some macrophyte functional groups are represented.</p> <p>Proposed crossing point is within this survey reach.</p> <p><i>030-RS2-129002 – (SP 38141 63965 to SP 37631 63896)</i></p> <p>HMS: 4680; HMC: 5; HQA: 28</p> <p>Wetted width: 12m</p> <p>Water depth: 1m</p> <p>Extensive resectioning and reinforcement of banks and channel, as well as a minor bridge and a lock contribute to a HMS of 4680, indicating a severely modified physical habitat structure. No substrate or flow variation was recorded, although some macrophyte functional groups are represented. Combined with the HQA score of 28 the watercourse has a very low level of naturalness.</p>
	030-FH1-129001 (15 May 2013)			<p><i>030-FH1-129001 – (SP 38675 64024 to SP 37631 63896)</i></p> <p>Poor cover for juvenile coarse and salmonid species. Poor spawning habitat for phytophilic (spawn on vegetation) and rheophilic coarse species (spawn in gravel) and salmonids.</p> <p>Deep water (dominant) with silt substrate.</p> <p>Overall habitat quality assessment – poor, minimal habitat variation, heavily reinforced banks and channel, with little substrate, flow or macrophyte diversity.</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
Unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-090; H7) (ordinary watercourse)	030-RS1-132001 (7 May 2013)	RCS	Complete	<p>030-RS1-132001 – (SP 36531 66496 to SP 36160 66622)</p> <p>A narrow, sinuous stream flowing through woodland and farmland. The channel was heavily shaded by mature trees, with no macrophytes growing in the channel. Habitat diversity improved by woody debris, submerged roots and riffle sections. The woodland was dominated by ash (<i>Fraxinus excelsior</i>), hawthorn (<i>Crataegus monogyna</i>), and white willow (<i>Salix alba</i>).</p> <p>Proposed crossing point has habitats and biotypes typical of survey reach with trees and shrubs on both banks.</p>
	030-RS2-132001 (7 May 2013)	RHS	Complete	<p>030-RS2-132001 – (SP 36531 66496 to SP 36184 66601)</p> <p>HMS: 200; HMC: 3; HQA: 58</p> <p>Wetted width: 0.8m</p> <p>Water depth: 0.05m</p> <p>A minor bridge results in a HMS of 200, and an HMC of 3 (obviously modified). However, variation in both substrate (gravel-pebble and cobble) and flow types (rippled, smooth and no perceptible) recorded appreciably enrich the riverine habitat. Two discrete pools, two discrete riffles, and three unvegetated point bars were also recorded in this survey.</p> <p>Proposed crossing point is within this survey reach.</p>
	030-FH1-132001 (7 May 2013)	FHS	Complete	<p>030-FH1-132001 – (SP 36531 66496 to SP 36184 66601)</p> <p>Moderate cover for juvenile coarse and salmonid species. Moderate spawning habitat (e.g. in channel vegetation) for phytophilic coarse species but poor spawning (e.g. gravel) habitat for rheophilic coarse fish and salmonids.</p> <p>Riffle, pool and glide (dominant) with substrates composed mainly of sand and clay.</p> <p>Overall habitat quality assessment – moderate.</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
River Leam (main river)	030-RS1-133001 (7 May 2013)	RCS	Complete	<p>030-RS1-133001 – (SP 36137 67680 to SP 35716 67405)</p> <p>A wide, deep river flowing through farmland with a shallow valley form. In-channel macrophytes were abundant, with large reed beds on both banks and in the middle of the channel. Marginal reed beds were dominated by reed canary-grass with patches of common reed, reed sweet-grass and branched bur-reed. Mid-channel reed beds were dominated by common club-rush. Submerged macrophytes were present in shallower sections, including the underwater ribbon-leaves of common club-rush and the cabbage-like leaves of yellow water-lily. Isolated patches of fennel pondweed (<i>Potamogeton pectinatus</i>) and submerged fool's water-cress (<i>Apium nodiflorum</i>) were also present.</p> <p>Proposed crossing point has habitats and biotypes typical of survey reach with trees and shrubs on both banks.</p>
	030-RS2-133001 (7 May 2013)	RHS	Complete	<p>030-RS2-133001 – (SP 36137 67680 to SP 35875 67513)</p> <p>HMS: 630; HMC: 4; HQA: 37</p> <p>Wetted width: 4m</p> <p>Water depth: 0.25m</p> <p>A minor bridge, minor ford, bank poaching and historical resectioning contribute to a HMS of 630, and an HMC of 4 (significantly modified). Where visible, sand substrate dominates, with gravel-pebble, clay and silt also recorded. Smooth flows dominate, with unbroken standing waves recorded at a discrete riffle feature which, along with three discrete pools, eroding cliffs and a vegetated side bar, appreciably enrich the riverine habitat.</p> <p>Proposed crossing point is within this survey reach.</p>
	030-FH1-133001 (7 May 2013)	FHS	Complete	<p>030-FH1-133001 – (SP 36137 67680 to SP 35875 67513)</p> <p>Poor cover for juvenile coarse and salmonid species. Poor spawning habitat for phytophilic and rheophilic coarse species and salmonids.</p> <p>Run (dominant), pool and riffle habitats present with varied substrate character.</p> <p>Overall habitat quality assessment – poor, potential for minor species only.</p>

Notes: RCS = River Corridor Survey, RHS = River Habitat Survey, FHS = Fish Habitat Survey, HMS = Habitat Modification Score, HMC=Habitat Modification Class, HQA = Habitat Quality Assessment

- 6.4.37 None of the watercourses within 100m of the land required for the construction of the Proposed Scheme in this area have statutory or non-statutory designations. Rivers and streams are identified as habitats of principal importance. The Warwickshire, Coventry and Solihull LBAP lists rivers and streams as priority habitats and their aims regarding these include: ensuring the quality of watercourses and their corridors do not deteriorate; and enhancing those watercourses supporting species of principal importance or Red Data Book species.
- 6.4.38 Habitat surveys conducted on the Grand Union Canal have identified the heavily modified nature of this watercourse (HMC 5 indicates a severely modified system) and that it supports only commonly occurring aquatic macrophytes which are well distributed within the watercourse. FHS has identified poor habitat availability for fish species as a result of the limited biotypes supported by this watercourse. The Proposed Scheme crossing point supports habitats and biotypes typical of the survey reach with trees and shrubs lining both banks.
- 6.4.39 Habitat surveys conducted on an unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-090; H7) have shown the channel to be heavily shaded (wooded riparian zone), with no in-channel macrophyte growth. The physical habitat is described as being obviously modified (HMC 3) but it retains some natural features and a sinuous planform. FHS identified moderate habitat quality for juvenile species of fish but poor spawning habitat. However, the watercourse supports a relatively diverse range of habitats and provides a valuable wildlife corridor in the area.
- 6.4.40 Habitat surveys conducted on the River Leam have shown the watercourse to support an abundant assemblage of commonly occurring aquatic macrophytes which are well distributed within the watercourse. The physical habitat is described as being significantly modified (HMC 3), although the watercourse retains a sinuous planform in some sections. A range of habitats and biotypes are supported within the surveyed reaches of this main river system the watercourse is also considered to provide a major wildlife corridor within the area.
- 6.4.41 The unnamed tributary watercourse of the River Leam (Volume 5: Map Books – Ecology, Map EC-10-087; B7) has been straightened and re-aligned throughout the reach crossed by and adjacent to the Proposed Scheme, largely conforming to the planform of the adjacent Grand Union Canal. It is also crossed by the existing Longhole Bridge and Welsh Road Bridge in this area where it will have been further modified and/or reinforced with artificial materials. Slightly greater sinuosity is evident through a riparian buffer strip that widens to a small copse separating the watercourse from the Grand Union Canal. It is likely to support only limited range of in-channel and riparian habitats.

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- 6.4.42 Main rivers within 100m of the area of land required for the construction of the Proposed Scheme include the River Avon (Warwickshire Avon), Finham Brook and Canley Brook.

- 6.4.43 Within this area the following watercourses are crossed by the route of the Proposed Scheme:
- River Avon;
 - Finham Brook;
 - Canley Brook (current alignment crossing at Volume 5: Map Books – Ecology, Map EC-10-096; C6, but will be crossed, following its realignment, by a viaduct at Volume 5: Map Books – Ecology, Map EC-10-096; H6); and
 - three unnamed tributary watercourses of the Canley Brook (Volume 5: Map Books – Ecology; Map EC-10-097; F6; Map EC-10-098; G7; and Map EC-10-098; B6).
- 6.4.44 Watercourses within 100m of the land required for the construction of the Proposed Scheme that are not crossed by the route include five unnamed tributary watercourses of the River Avon.
- 6.4.45 In addition to rail route crossings, there are a number of road diversions and footpaths which will result in the following watercourses being crossed:
- road diversion crossing and associated culverts on an Unnamed tributary watercourse of the River Avon (Volume 5: Map Books – Ecology; Map 10-094; G9, 320m west of the route);
 - bridleway crossing of an Unnamed tributary watercourse of the Canley Brook (Volume 5: Map Books – Ecology; Map 10-097; H7, 140m east of the route); and
 - access/footpath crossing of an unnamed watercourse of the Canley Brook (Volume 5: Map Books – Ecology; Map 10-098; H6, 140m east).
- 6.4.46 Full information on the WFD status of WFD assessed watercourses (including canals) is provided in the Water Resources and Flood Risk Assessment Chapter for this area.
- 6.4.47 Three WFD assessed water bodies within the Severn District River Basin Management Plan (RBMP) fall within this area, namely the River Avon, Finham Brook and Canley Brook. Specific information regarding their assessment is provided in Table 118.

Table 118: WFD ecological element assessment

Watercourse	WFD water body name	WFD water body ID	Morphological designation	Ecological element assessed and status/potential
River Avon	R Avon (Warks) – conf R Sowe to conf R Leam	GB109054043840	Not designated AWB/HMWB	<i>Poor status</i> Macro-invertebrates – moderate Phytobenthos – poor
	R Avon – Claycoton Yelvertoft Bk to conf R Sowe	GB109054043920	Not designated AWB/HMWB	<i>Poor status</i> Fish – good Macro-invertebrates – moderate Phytobenthos – poor

Watercourse	WFD water body name	WFD water body ID	Morphological designation	Ecological element assessed and status/potential
Finham Brook	Finham Bk – conf Canley Bk to conf R Sowe	GB109054044480	Not designated AWB/HMWB	<i>Moderate status</i> Invertebrates – moderate
Canley Brook	Canley Bk – source to conf with Finham Bk	GB109054044520	Not designated AWB/HMWB	<i>Moderate status</i> Invertebrates – good

Notes: WFD = Water Framework Directive, AWB = Artificial Water Body, HMWB = Heavily Modified Water Body

6.4.48 All have the objective of reaching good ecological status by 2027. Both of the River Avon water bodies are assessed as being at poor status, being limited by aquatic macro-invertebrates and phytobenthos as well as phosphate. The Finham Brook is at moderate status and limited by aquatic macro-invertebrates and flow quantity and dynamics. The Canley Brook is at moderate status and is limited by phosphate and flow quantity and dynamics.

6.4.49 Environment Agency macrophyte survey data is available for one site on the River Avon (collected in 2007 – 6.82km downstream of the Proposed Scheme crossing of the River Avon). This is presented in Table 119.

Table 119: Environment Agency aquatic macrophyte data by relevant WFD water body

Watercourse	WFD water body ID	Site name (Site ID) and NGR	Period of record (No. of records)	Details of most recent survey
River Avon	GB109054043920	Bubbenhall Bridge (146908) SP 36300 73500	13 September 2007 (1)	Site located 6.82km – downstream of crossing. MTR: 27.8; MFR: 1.73; RMNI: 8.52; RMHI: 8.22 N_ATAXA_R: 12; N_RFG: 8

Notes: WFD = Water Framework Directive, MTR = Mean Trophic Rank, MFR = Mean Flow Rank, RMNI = River Macrophyte Nutrient Index, RMHI = River Macrophyte Hydraulic Index, N_ATAXA_R = Number of Aquatic Taxa⁵⁶, N_RFG = Number of Functional River Groups

6.4.50 These data indicate a relatively species rich assemblage (N_ATAXA_R: 12; N_RFG: 8) characteristic of lowland stream systems with high nutrient loading (RMNI: 8.52) and moderately high flows (RMHI: 8.22).

6.4.51 No Environment Agency RHS data is available for the WFD water bodies in this area.

Survey data

6.4.52 The following five watercourses within this area were identified as requiring RCS, RHS and FHS.

- River Avon;
- unnamed tributary watercourse of the River Avon (located in land required for the construction of the Proposed Scheme at Volume 5: Map Books – Ecology, Map EC-10-094; A10, 510m west of the route);
- Finham Brook;
- Canley Brook; and
- unnamed tributary watercourse of the Canley Brook (Volume 5: Map Books – Ecology, Map EC-10-098; G7).

- 6.4.53 RHS, RCS and RHS data are presented in Table 120.
- 6.4.54 No access has been obtained for the required survey area on the unnamed tributary watercourse of the River Avon (Volume 5: Map Books – Ecology, Map EC-10-094; A10, 510m west of the route) as described in Table 112.

Table 120: Summary of habitat survey results for watercourses (including canals) for CFA18

Watercourse	Ecology survey code (survey date)	Type of survey	Survey status	Survey results
River Avon (main river)	030-RS1-138001 (20 August 2012)	RCS	Complete	<i>030-RS1-138001 – (SP 32650 72170 to SP 32440 72370)</i> A comparatively wide (average width 7m), deep (2m) river with a straight channel and steep banks. The surrounding land use was improved grassland and trees/shrubs. Yellow water-lily was common throughout this reach, with submerged and floating leaves present. Small reed beds were present at both margins, dominated by common club-rush and branched bur-reed.
	030-RS1-138002 (20 August 2012)			<i>030-RS1-138002 – (SP 32880 71520 to SP 32650 72170)</i> A wider (average width 12m), shallower (0.7m) river reach with a straight channel and steep banks. The surrounding land use was improved grassland and trees/shrubs. Reeds/grasses were abundant in this section with mid channel and wide marginal beds of common club-rush and branched bur-reed. This section supported a variety of submerged macrophytes including the underwater leaves of common club-rush, yellow water-lily and the non-native Nuttall's pondweed. Patches of floating leaved macrophytes were also present in slow-flowing areas, including yellow water-lily and arrowhead.
	030-RS1-138003 (20 August 2012)			<i>030-RS1-138003 – (SP 33320 71580 to SP 32880 71490)</i> A comparatively wide (average width 12m), shallower river reach (0.4m) with a straight channel and steep banks. The surrounding land use was improved grassland and broadleaf woodland. Moderately/heavily shaded by trees. Macrophytes were patchy and dominated by submerged species with some isolated reed beds. The dominant submerged taxa were common club-rush, unbranched bur-reed with a single stand of river water-crowfoot. The small reed beds were dominated by branched bur-reed and reed canary-grass.
	030-RS1-139001 (20 August 2012)			<i>030-RS1-139001 – (SP 32220 72220 to SP 31920 72060)</i> A comparatively wide (average width 16m), deep river (2m) with a straight channel and steep banks. The surrounding land use was improved grassland and woodland. Macrophyte growth was limited to shallower areas of the channel. The downstream end of the survey reach was wider and shallower with extensive macrophyte growth (>70% cover). Reed beds at the downstream end were dominated by common club-rush and branched bur-reed. The dominant submerged species was unbranched bur-reed with patches of floating-leaved yellow water-lily.
	030-RS1-139002 (20 August 2012)			Proposed crossing point within this survey reach. At proposed crossing point the watercourse habitat and biotypes were typical, with woodland on both banks.
				<i>030-RS1-139002 – (SP 32610 72450 to SP 32260 72250)</i>

Watercourse	Ecology survey code (survey date)	Type of survey	Survey status	Survey results
				A comparatively wide (average width 10m), deep river (1.5m) with a straight channel and steep banks. The surrounding land use was improved grassland and woodland. Patches of submerged species were present. Unbranched bur-reed was the most abundant species, with isolated patches of fennel pondweed and water-starwort. Small marginal reed beds were dominated by common club-rush and branched bur-reed. The woodland on the right hand bank was dominated by white willow.
	030-RS2-138001 (13 May 2013) 030-RS2-138002 (13 May 2013) 030-RS2-138003 (13 May 2013) 030-RS2-139001 (13 May 2013)	RHS	Complete	<p><i>030-RS2-138001 – (SP 33322 71575 to SP 32895 71570)</i></p> <p>HMS: 4240; HMC: 5; HQA: 49</p> <p>Wetted width: 14m</p> <p>Water depth: 0.6m</p> <p>Two major bridges, major and intermediate weirs, as well as extensive resectioning of both banks and channel contribute to a HMS of 4240, indicating a severely modified physical habitat structure. Where visible, gravel/pebble substrate dominates, with a mix of smooth, rippled, and upwelling flows recorded. Several macrophyte functional groups were also represented, including submerged broad, linear and fine-leaved, and emergents.</p> <p><i>030-RS2-138002 – (SP 32877 71531 to SP 32712 72100)</i></p> <p>HMS: 2900; HMC: 5; HQA: 47</p> <p>Wetted width: 14m</p> <p>Water depth: 0.5m</p> <p>A minor bridge, minor outfalls and extensive resectioning of both banks and channel contribute to a HMS of 2900, indicating a severely modified physical habitat structure. Where visible, silt substrate dominates, with gravel/pebble and sand also recorded. Smooth flows dominate, with several macrophyte functional groups represented, including submerged broad and linear-leaved, and emergents. One discrete riffle was also recorded during this survey.</p> <p><i>030-RS2-138003 – (SP 3460 72364 to SP 32719 71921)</i></p> <p>HM: 2934; HMC: 5; HQA: 45</p> <p>Wetted width: 12m</p>

Watercourse	Ecology survey code (survey date)	Type of survey	Survey status	Survey results
				<p>Water depth: 0.5m</p> <p>A minor bridge, complete resectioning of both banks and channel, and some reinforcement of banks contribute to a HMS of 2934, indicating a severely modified physical habitat structure. Silt substrate dominates, with sand also recorded. Smooth flows dominate, with several macrophyte functional groups represented, including submerged broad, linear and fine-leaved, emergents and floating leaved (rooted).</p> <p><i>030-RS2-139001 – (SP 31883 72087 to SP 32347 72030)</i></p> <p>HMS: 2830; HMC: 5; HQA: 53</p> <p>Wetted width: 19m</p> <p>Water depth: 0.5m</p> <p>The Proposed Scheme crossing point is within this survey reach. An intermediate bridge and extensive resectioning of both banks and channel, contribute to a HMS of 2830, indicating a severely modified physical habitat structure. Silt substrate dominates, with sand also recorded. Smooth flows dominate, with several macrophyte functional groups represented, including submerged broad and linear-leaved, emergents, floating leaved (rooted) and amphibious. Adjacent wet woodland was recorded as a special feature. Based on HQA score, this reach has the highest level of naturalness in its physical habitat, as compared with adjacent reaches surveyed.</p>
	<p>030-FH1-138001 (14 May 2013)</p> <p>030-FH1-139001 (15 August 2012)</p>	FHS	Complete	<p><i>030-FH1-138001 – (SP 33322 71575 to SP 32460 72364)</i></p> <p>Good and moderate cover for juvenile coarse species and salmonids respectively. Moderate spawning habitat (e.g. in channel vegetation) for phytophilic (spawn on vegetation) coarse fish and poor spawning habitat (e.g. gravel) for rheophilic (spawn on gravel) species.</p> <p>Habitat types observed include deep water, run and riffle features. Barriers to fish migration observed (3 weirs).</p> <p>Overall habitat quality assessment – moderate.</p> <p><i>030-FH1-139001 – (SP 32347 72330 to SP 31883 72087)</i></p> <p>Moderate cover for juvenile salmonid and coarse species and moderate for spawning for phytophilic coarse species. Poor spawning for rheophilic coarse species and salmonids.</p> <p>Limited habitat diversity with deep water dominant.</p>

Watercourse	Ecology survey code (survey date)	Type of survey	Survey status	Survey results
				Overall habitat quality assessment – poor Proposed crossing point within this survey reach.
Finham Brook (main river)	030-RS1-141001 (9 May 2013)	RCS	Complete	<i>030-RS1-141001 – (SP 30868 73077 to SP 31127 73405)</i> A sinuous woodland stream in farmland with regular riffles and pools. The channel was overhung throughout the length of the survey section by mature alder. No macrophytes were present in the channel, probably due to heavy shading, but coarse woody debris and submerged roots provided diverse habitat. The non-native invasive plant Himalayan balsam was present on both banks. Proposed crossing point within this survey reach. At proposed crossing the watercourse habitats and biotypes were typical of survey reach with trees lining both banks and riffles/pools in-channel.
	030-RS2-141001 (9 May 2013)	RHS	Complete	<i>030-RS2-141001 – (SP 30868 73077 to SP 31096 73304)</i> HMS: 350; HMC: 3; HQA: 44 Wetted width: 4.5m Water depth: 0.1m The Proposed Scheme crossing point is within this survey reach. Some bank reinforcement and an intermediate bridge contribute to a HMS of 350, indicating an obviously modified physical habitat structure. Where visible, sand substrate dominates, with silt also recorded. Smooth flows dominate with rippled flow also recorded. Relatively few macrophyte functional groups were represented, limited to filamentous algae, and livers/lichens/mosses. Leafy debris and leaf dams were recorded as special features, in addition to eroding cliffs, three discrete pools and two discrete riffles which appreciably enrich the riverine habitat at this reach.
	030-FH1-141001 (9 May 2013)	FHS	Complete	<i>030-FH1-141001 – (SP 30868 73077 to SP 31133 73407)</i> Moderate cover for juvenile coarse species, poor for juvenile salmonids. Good spawning habitat for rheophilic coarse species and salmonids, poor spawning habitat for phytophilic species. Good range of habitats and sediment types present. Overall habitat quality assessment – moderate

Watercourse	Ecology survey code (survey date)	Type of survey	Survey status	Survey results
Canley Brook (main river)	030-RS1-142001 (8 May 2013)	RCS	Complete	<p>030-RS1-142001 – (SP 29807 74527 to SP 30031 74140)</p> <p>A sinuous woodland Brook flowing through adjacent farmland which has been developed as broadleaf plantation. Multiple side channels were present. Introduced stone and debris dams in the main channel. The marginal trees were dominated by alder and white willow, with some overhanging branches and exposed roots. The alder trees were growing in-channel with accumulations of sediment at the base. No aquatic macrophytes were present in the section.</p> <p>030-RS1-142002 – (SP 30032 74139 to SP 30049 73647)</p> <p>A more natural reach than 030-RS1-142001, with less resectioning. 70% of the reach was heavily shaded by mature alder and white willow. Both tree species were found on the banktop and growing in-channel, creating side bars and erosion between roots. In unshaded sections, water-crowfoot was present. One small patch of reed canary-grass was present at the downstream end.</p> <p>Proposed crossing point within this survey reach. At proposed crossing the watercourse habitats and biotypes were typical of survey reach with trees lining both banks and riffles/pools in-channel.</p>
	030-RS2-142001 (8 May 2013)			<p>030-RS2-142001 – (SP 29807 74527 to SP 29990 74206)</p> <p>HMS: 120; HMC: 2; HQA: 50</p> <p>Wetted width: 3.5m</p> <p>Water depth: 0.3m</p> <p>Some resectioning of the right bank results in a HMS of 120, indicating a predominantly unmodified physical habitat structure. Where visible, a mix of sand, clay and gravel/pebble substrates dominate, with cobbles also recorded. Smooth flows dominate with rippled flow also recorded. The only macrophyte functional group recorded was filamentous algae. Stable and eroding cliffs, an unvegetated side bar, and three discrete pools appreciably enrich the riverine habitat at this reach, in addition to backwater habitat which was recorded as a special feature. Based on HQA score, this reach has the higher level of naturalness in its physical habitat, as compared with adjacent reach surveyed.</p> <p>030-RS2-142002 – (SP 30032 74139 to SP 29969 73762)</p> <p>HMS: 300; HMC: 3; HQA: 47</p> <p>Wetted width: 3m</p>

Watercourse	Ecology survey code (survey date)	Type of survey	Survey status	Survey results
				<p>Water depth: 0.4m</p> <p>The Proposed Scheme crossing point is within this survey reach. A major bridge results in a HMS of 300, indicating an obviously modified physical habitat structure. Where visible, clay and sand substrates dominate, with gravel/pebble also recorded. Smooth flows dominate with rippled flow also recorded. Submerged fine-leaved macrophytes were recorded as extensive. Water meadow was recorded as a special feature, in addition to eroding cliffs and a discrete riffle which appreciably enrich the riverine habitat in this reach.</p>
	030-FH1-142001 (8 May 2013) 030-FH1-142002 (8 May 2013)	FHS	Complete	<p><i>030-FH1-142001 – (SP 29807 74527 to SP 29990 74206)</i></p> <p>Moderate cover for juvenile coarse species, poor for salmonids. Poor for spawning coarse and salmonid species.</p> <p>A limited range of habitats observed with clay substrates dominating.</p> <p>Overall habitat quality assessment – poor</p> <p><i>030-FH1-142002 – (SP 30032 74139 to SP 29969 73762)</i></p> <p>Moderate cover for juvenile coarse species, poor for salmonids. Poor for spawning coarse and salmonid species.</p> <p>A limited range of habitats observed with clay substrates dominating.</p> <p>Overall habitat quality assessment – moderate, on account of the abundance of underwater tree roots providing good habitat cover.</p>
Unnamed tributary watercourse of the Canley Brook (Volume 5: Map Books – Ecology, Map EC-10-098; G7) (ordinary watercourse)	030-RS1-145001 (8 May 2013)	RCS	Complete	<p><i>030-RS1-145001 – (SP 27848 75120 to SP 28441 75114)</i></p> <p>A narrow, shallow, sinuous woodland stream with a sandy substrate. The whole section was heavily shaded with no macrophyte growth. The downstream section was resectioned between a man-made lake and farm buildings. Detritus was abundant due to overhanging mature trees and associated leaf fall.</p> <p>Proposed crossing point within this survey reach. At proposed crossing the watercourse habitats and biotypes were typical of survey reach with woodland on both banks.</p>

Watercourse	Ecology survey code (survey date)	Type of survey	Survey status	Survey results
	030-RS2-145001 (8 May 2013)	RHS	Complete	<p>030-RS2-145001 – (SP 27848 75121 to SP 28134 75120)</p> <p>HMS: 250; HMC: 3; HQA: 39</p> <p>Wetted width: 0.8m</p> <p>Water depth: 0.05m</p> <p>An intermediate bridge and some reinforcement of the right bank results in a HMS of 250, indicating an obviously modified physical habitat structure. Sand substrate and smooth flows dominate. The only macrophyte functional group recorded was liverworts/mosses/lichens. Eroding cliffs, side channels and leafy debris all appreciably enrich the riverine habitat in this reach.</p>
	030-FH1-145001 (8 May 2013)	FHS	Complete	<p>030-FH1-145001 – (SP 27848 75125 to SP 28182 75122)</p> <p>Poor cover for juvenile coarse and salmonid species. Poor for spawning coarse and salmonid species.</p> <p>Homogenous channel with some substrate diversity. Multiple blockages occurred within the channel due to limited width and depth.</p> <p>Overall habitat quality assessment – poor</p>

Notes: RCS = River Corridor Survey, RHS = River Habitat Survey, FHS = Fish Habitat Survey, HMS = Habitat Modification Score, HMC=Habitat Modification Class, HQA = Habitat Quality Assessment⁶¹

- 6.4.55 None of the watercourses within 100m of the area of land required for the construction of the Proposed Scheme in this area have statutory designations. Rivers and streams are identified as UK habitats of principal importance. The Warwickshire, Coventry and Solihull LBAP lists rivers and streams as priority habitats and their aims regarding these include: ensuring the quality of watercourses and their corridors do not deteriorate; and enhance those watercourses supporting UK species of principal importance or Red Data Book species.
- 6.4.56 The River Avon is designated as a Local Wildlife Site (LWS) including the section at, and adjacent to, the route of the Proposed Scheme on account of it supporting natural features, including several islands, remnant channels and abundant diverse riparian vegetation. The Warwickshire Scarce (a species with between 4 and 10 county records) river water-crowfoot and Warwickshire Notable (an uncommon plant found at more than 10 sites but indicative of a good quality habitat) unbranched bur-reed were also recorded at survey. Habitat surveys identified the river as being severely modified, of moderate/low interest as a fisheries resource and as containing a limited range of in-channel habitats, although the riparian structure was complex including wooded sections.
- 6.4.57 Habitat surveys conducted on the Finham Brook have identified the watercourse as being obviously modified (HMC: 3) but retaining a sinuous planform with regular riffles and deep pools. The riparian zone is characterised by mature alder which naturally limits in-channel macrophyte growth. The Finham Brook has been identified as providing good habitat for rheophilic spawning species.
- 6.4.58 Habitat surveys conducted on two reaches of the Canley Brook have identified the watercourse as ranging from obviously modified to predominantly unmodified (HMC: 3 and 2) and containing a wide range of in-channel habitat features and tree lined sections. Aquatic macrophytes supported in unshaded sections of the Canley Brook included water-crowfoot species. In both reaches surveyed moderate habitat for juvenile fish species was observed, but only poor habitat for spawning fish.
- 6.4.59 Habitat surveys conducted on the unnamed tributary watercourse of the Canley Brook (Volume 5: Map Books – Ecology, Map EC-10-098; G7) identified the watercourse as being obviously modified (HMC: 3) with a homogenous channel form shallow flow supporting a limited range of habitats and biotypes. The overall fish habitat quality was assessed as poor.
- 6.4.60 Access constraints prevented survey of the unnamed tributary watercourse of the River Avon (located within land required for the construction of the Proposed Scheme – Volume 5: Map Books – Ecology, Map EC-10-094; A10, 510m west of the route). However, this small tributary watercourse is designated as part of the River Avon LWS and as such is recognised as an important habitat feature.
- 6.4.61 A number of minor watercourses were screened out of requirement for habitat survey based on survey scoping criteria. These are still likely to provide valuable wildlife corridors and habitats for aquatic species.

CFA19 Coleshill Junction

Desk study

- 6.4.62 Main rivers within 100m of the area of land required for the construction of the Proposed Scheme include the River Cole, an unnamed tributary watercourse of the River Cole and the River Tame.
- 6.4.63 Within this area the following watercourses will be crossed by the route of the Proposed Scheme:
- unnamed tributary watercourse of the River Cole (Volume 5: Map Books – Ecology, Map EC-10-109; G6);
 - unnamed tributary watercourse of the River Cole (Volume 5: Map Books – Ecology, Map EC-10-109; E6);
 - River Cole (current river alignment crossed by the route and Birmingham spur at Volume 5: Map Books – Ecology, Map EC-10-109; B6). Following proposed realignment works river will be crossed at two locations by viaducts (Volume 5: Map Books – Ecology, Map EC-10-110; E6 (main line) and Map EC-10-110; I7 (Birmingham spur));
 - unnamed tributary watercourse of the River Tame (Volume 5: Map Books – Ecology, Map EC-10-111; E4 (currently in culvert));
 - unnamed tributary watercourse of the River Tame (Volume 5: Map Books – Ecology, Map EC-10-111; E4 (currently in culvert)); and
 - River Tame (crossed by viaduct array – Volume 5: Map Books – Ecology, Map EC-10-111; C4).
- 6.4.64 Watercourses within 100m of the area of land required for the construction of the Proposed Scheme that will not be crossed by the route include:
- unnamed tributary watercourse of the River Blythe (Volume 5: Map Books – Ecology, Map EC-10-108; H5); and
 - unnamed tributary watercourse of the River Cole (Volume 5: Map Books – Ecology, Map EC-10-109; C5).
- 6.4.65 In addition to route crossings, there is one road diversion which will result in a crossing of the River Cole associated with the B4114 diversion (Volume 5: Map Books – Ecology, Map EC-10-110; J5, 150m west of the route) following the River Cole realignment.
- 6.4.66 Full information on the WFD status of WFD assessed watercourses (including canals) is provided in the Water Resources and Flood Risk Assessment Chapter for this area.
- 6.4.67 Two WFD assessed water bodies (watercourses) within the Humber District River Basin Management Plan (RBMP) fall within this area, namely the River Cole and River Tame. Specific information regarding their assessment is provided in Table 121. Under the WFD the River Cole and River Tame have the objective of achieving good ecological potential by 2027

- 6.4.68 The ecological potential of both the River Cole and the River Tame are limited by fish, invertebrates, phosphate and their mitigation measures assessments. Both are designated as heavily modified water bodies (HMWB) for the purposes of flood protection and urbanisation.

Table 121: WFD ecological element assessment

Watercourse	WFD water body name	WFD water body ID	Morphological designation	Ecological element assessed and status/potential
River Cole	River Cole from Hatchford-Kingshurst Brook to River Blythe	GB104028042420	HMWB	<i>Moderate potential</i> Fish – moderate Invertebrates – moderate
River Tame	River Tame from confluence of the two arms to River Blythe	GB104028046840	HMWB	<i>Moderate potential</i> Fish – poor Invertebrates – bad

Notes: WFD = Water Framework Directive, AWB = Artificial Water Body, HMWB = Heavily Modified Water Body

- 6.4.69 Environment Agency macrophyte survey data (2011) is available for three sites on the River Cole (GB104028042420) at Coles Hill Farm, Coleshill and Coleshill Quarry and one site on the River Tame (GB109054043840) at Water Orton (Table 122).

Table 122: Environment Agency aquatic macrophyte data by WFD water body

Watercourse	WFD water body ID	Site name (Site ID) and NGR	Period of record (No. of records)	Details of most recent survey
River Cole	GB104028042420	Coleshill Hall Farm (157299) SP 18997 88010	13 September 2011 (1)	Site located 1.62km upstream of the route crossing. MTR: 21.9; MFR: 2.14; RMNI: 7.9; RMHI: 7.48; N_ATAXA_R: 7; N_RFG: 7
		Coleshill (52782) SP 19924 89512	13 August 2005 to 13 September 2011 (3)	Site located 1.52km downstream of the route crossing. MTR: 27.7; MFR: 1.43; RMNI: 7.63; RMHI: 7.35; N_ATAXA_R: 3; N_RFG: 3
		Coleshill Quarry (157300) SP 20249 90623	13 September 2011 (1)	Site located 3.19km downstream of the route crossing. MTR: 25.0; MFR: 1.83; RMNI: 7.53; RMHI: 7.22; N_ATAXA_R: 5; N_RFG: 4
River Tame	GB104028046840	Water Orton (47255) SP 16900 91400	19 July 2005 to 17 July 2006 (2)	Site located 2.55km upstream of the route crossing. MTR: 28.2; MFR: 2.13; RMNI: 8.1; RMHI: 7.62; N_ATAXA_R: 18; N_RFG: 11

Notes: WFD = Water Framework Directive, MTR = Mean Trophic Rank, MFR = Mean Flow Rank, RMNI = River Macrophyte Nutrient Index, RMHI = River Macrophyte Hydraulic Index, N_ATAXA_R = Number of Aquatic Taxa, N_RFG = Number of Functional River Groups

- 6.4.70 Macrophyte data for the River Cole indicates the presence of a relatively species poor assemblage (N_ATAXA_R: 7, 3 and 5) characteristic of lowland stream systems with high nutrient loading (RMNI: 7.9, 7.63 and 7.35). The Coleshill Hall Farm site survey contains proportionally more species associated with higher flow velocities (RMHI: 7.48) such as stream water-crowfoot (*Ranunculus penicillatus* ssp. *pseudofluitans*).

6.4.71 Environment Agency data for the River Tame at Water Orton (sampled in 2006) indicate the presence of species rich assemblage (N_ATAXA-R: 18) indicative of nutrient rich lowland system systems (RMNI: 8.1). The RMHI score indicates the presence of a limited number of species associated with high flow velocities, with stream water-crowfoot being recorded.

6.4.72 Desktop river habitat data is limited to RHS on the River Cole and River Tame (Table 123).

Table 123: Environment Agency RHS survey data by WFD water body

Water body	WFD water body ID	Site name (Site ID) and NGR	Period of record (No. of records)	Details of most recent survey
River Cole	GB104028042420	(25795) SP 20157 89763	20 July 2010 (1)	Site located 1.94km downstream of the route crossing. Wetted width: 8m Water depth: 0.5m HMS: 270; HMC: 3; HQA: 36; HQA Adjusted: 35
River Tame	GB104028046840	(18222) SP 17361 91404	12 August 2005 (1)	Site located 2.07km upstream of the route crossing. Wetted width: 11m Water depth: 0.5m HMS: 3454; HMC: 5; HQA: 31; HQA Adjusted: 28

Notes: RCS = River Corridor Survey, RHS = River Habitat Survey, FHS = Fish Habitat Survey, HMS = Habitat Modification Score, HMC=Habitat Modification Class, HQA = Habitat Quality Assessment

6.4.73 The RHS on the River Cole identifies the watercourse at this location as being obviously modified (HMC: 3). The survey site is coincident with a restored section of the river, realigned to a more natural planform. Channel substrate was recorded as predominantly silt with some gravel and flow type dominated by smooth flow. A variety of vegetation types were recorded within the channel.

6.4.74 The RHS on the River Tame identifies the watercourse at this location as severely modified (HMC: 5). The survey identifies the channel as realigned and over deepened for more than one third of the survey length. Substrate was recorded as predominantly gravel and flow types included rippled, smooth and unbroken wave indicating a limited range of in channel habitat. Filamentous algae were recorded as extensive and submerged fine leaved plants as present within the survey reach.

6.4.75 Both RHS survey sites are located over one kilometre from the route of the Proposed Scheme on these rivers and as such are considered to be only indicative of the river habitat conditions at the crossing point.

Survey data

6.4.76 The following watercourses have been identified as requiring RCS, RHS and FHS:

- River Cole (Volume 5: Map Books – Ecology, Map EC-10-109; G7, 50m west of the route);
- unnamed tributary watercourse of the River Cole (Volume 5: Map Books – Ecology, Map EC-10-109; G6);

- unnamed tributary watercourse of the River Cole (Volume 5: Map Books – Ecology, Map EC-10-109; E6);
- River Cole (current river alignment crossed by the route and Birmingham spur at Volume 5: Map Books – Ecology, Map EC-10-109; B6). Following proposed realignment works river will be crossed at two locations by viaducts (Volume 5: Map Books – Ecology, Map EC-10-110; E6 (main line) and Map EC-10-110; I7 (Birmingham spur)); and
- River Tame.

6.4.77 RHS, RCS and FHS data are presented in Table 124.

6.4.78 No access has been obtained for the required survey area on the unnamed tributary watercourses of the River Cole and sections of the River Cole as described in Table 112.

Table 124: Summary of habitat survey results for watercourses (including canals) for CFA19

Watercourse	Ecology survey code (survey date)	Type of survey	Survey status	Survey results
River Cole (main river)	030-RS1-162001 (14 May 2013)	RCS	Incomplete	<p>030-RS1-162001 – (SP 18979 88965 to SP 19267 89554)</p> <p>A heavily engineered, wide, slow-flowing river reach with some shallow sections including exposed gravels. Macrophytes were abundant upstream of the M42 road bridge with large patches of submerged fennel pondweed and curled pondweed (<i>Potamogeton crispus</i>) present. Reed/grasses were present in large marginal beds throughout the section (except the upstream end), with reed canary-grass the dominant species and some branched bur-reed. Riparian zone composed of improved grassland and mixed woodland.</p> <p>Survey reach includes section river upstream of motorway bridge that will be lost following the Proposed Scheme realignment of the River Cole.</p>
	030-RS2-162001 (14 May 2013) 030-RS2-162002 (14 May 2013)	RHS	Incomplete	<p>030-RS2-162001 – (SP 18979 88965 to SP 19114 89338)</p> <p>HMS: 2890; HMC: 5; HQA: 40</p> <p>Wetted width: 12m</p> <p>Water depth: 0.15m</p> <p>Extensive resectioning and some reinforcement of banks and channel, as well as a major bridge and a weir contribute to a HMS of 2890, indicating a severely modified physical habitat structure. Limited substrate variation was recorded, although a range of macrophyte functional groups were represented.</p> <p>Survey reach coincident with section of river that will be lost following the Proposed Scheme realignment of the River Cole.</p> <p>030-RS2-162002 – (SP 19114 89338 to SP 19271 89549)</p> <p>HMS: 980; HMC: 4; HQA: 25</p> <p>Wetted width: 8m</p> <p>Water depth: 0.5m</p> <p>Less resectioning and bank reinforcement than adjoining reach contribute to a HMS of 980, indicating a significantly modified physical habitat structure. Limited substrate variation was recorded, although a range of macrophyte functional groups were represented.</p>

Watercourse	Ecology survey code (survey date)	Type of survey	Survey status	Survey results
	030-FH1-162001 (14 May 2013)	FHS	Incomplete	<p>030-FH1-162001 – (SP 18979 88965 to SP 19271 89549)</p> <p>Moderate cover for juvenile salmonid and coarse species. Moderate spawning habitat for phytophilic (spawn on vegetation) and rheophilic (spawn in gravels) coarse fish and poor spawning habitat for salmonids.</p> <p>Habitat types observed run, riffle, pool and glide features.</p> <p>Overall habitat quality assessment – moderate.</p>
River Tame (main river)	030-RS1-164001 (21 August 2012) 030-RS1-164002 (21 August 2012)	RCS	Complete	<p>030-RS1-164001 – (SP 1866 9182 to SP 1905 9151)</p> <p>A wide, resectioned river, reinforced at upstream end. Macrophytes were abundant with approximately 50% total cover. Reed beds were abundant upstream of the existing railway bridge, but restricted to the shallow margins of the channel. The dominant grass species present was reed canary-grass with the submerged taxa dominated by fennel pondweed. Some small patches of river water-crowfoot were present amongst the stands of fennel pondweed. A wide variety of emergent herbs were also present at the margins, including water-cress (<i>Rorippa nasturtium-aquaticum</i>), brooklime (<i>Veronica beccabunga</i>), water plantain (<i>Alisma plantago-aquatica</i>), water-pepper (<i>Persicaria hydropiper</i>) and the non-native Himalayan balsam. Himalayan balsam was abundant on both banks in this reach.</p> <p>Riparian zone characterised by the presence of semi-improved grassland with occasional tree and shrub lined sections.</p> <p>030-RS1-164002 – (SP 1907 9149 to SP 1949 9135)</p> <p>A wide, resectioned river. The banks appeared to be reinforced, with earth over the top of concrete. The channel was choked with vegetation, with approximately 80% macrophyte cover. The macrophytes were dominated by submerged fennel pondweed. Himalayan balsam was abundant on both banks in this reach. Isolated emergent herbs and reeds were present in slower-flowing marginal areas, these included water plantain, water-pepper, reed canary-grass, and pendulous sedge (<i>Carex pendula</i>).</p> <p>Riparian zone characterised by the presence of semi-improved grassland and industrial buildings (including major Sewage Treatment Works) with occasional tree and shrub lined sections.</p> <p>Proposed crossing point within this survey reach where in-channel habitat and biotypes are typical of survey reach. Riparian zone is uncharacteristic as it is lined on both banks with mature trees including white willow, white poplar (<i>Populus alba</i>) and common lime (<i>Tilia × europaea</i>).</p>

Watercourse	Ecology survey code (survey date)	Type of survey	Survey status	Survey results
	030-RS2-164001 (3 June 2013) 030-RS2-164002 (3 June 2013)	RHS	Complete	<p><i>030-RS2-164001 – (SP 19297 91418 to SP 19787 91205)</i></p> <p>HMS: 3550; HMC: 5; HQA: 36</p> <p>Wetted width: 21m</p> <p>Water depth: 0.3m</p> <p>Extensive resectioning and some reinforcement of banks and channel, as well as a minor bridge and intermediate sized outfall contribute to a HMS of 3550, indicating a severely modified physical habitat structure. A limited range of macrophyte function groups and substrate variation was recorded.</p> <p><i>030-RS2-162002 – (SP 19193 91433 to SP 13790 91727)</i></p> <p>HMS: 4105; HMC: 5; HQA: 35</p> <p>Wetted width: 21m</p> <p>Water depth: 0.5m</p> <p>Extensive resectioning and some reinforcement of banks and channel, as well as a minor bridge and intermediate sized outfall contribute to a HMS of 4105, indicating a severely modified physical habitat structure. River supported a greater range of macrophyte function groups than above.</p> <p>Proposed crossing point within this survey reach.</p>
	030-FH1-164001 (3 June 2013)	FHS	Complete	<p><i>030-FH1-164001 – (SP 19787 91205 to SP 18342 91718)</i></p> <p>Moderate cover for juvenile salmonid and coarse species. Moderate spawning habitat for phytophilic and rheophilic coarse fish and poor spawning habitat for salmonids.</p> <p>Wide range of in-channel features including glide, pool, run, riffle and deep water habitats with cobble the dominant substrate type. Evidence of pollution from road runoff and fly tipping as well as empty chemical bottles observed beside river at bridge crossings at survey.</p> <p>Overall habitat quality assessment – moderate.</p>

Notes: RCS = River Corridor Survey, RHS = River Habitat Survey, FHS = Fish Habitat Survey, HMS = Habitat Modification Score, HMC=Habitat Modification Class, HQA = Habitat Quality Assessment⁵¹

- 6.4.79 None of the watercourses within 100m of the land required for the construction of the Proposed Scheme in this area have statutory designations. Rivers and streams are identified as UK habitats of principal importance. The Warwickshire, Coventry and Solihull LBAP lists rivers and streams as priority habitats and their aims regarding these include: ensuring the quality of watercourses and their corridors do not deteriorate; and enhancing those watercourses supporting species of principal importance or Red Data Book species.
- 6.4.80 Although not itself designated, the River Cole (Volume 5: Map Books – Ecology, Map EC-10-109; G7, 50m west of the route) adjoins two LWS: Wheeley Moor Farm Meadows LWS and Cole Bank Park LWS which within 1km of the land required for construction of the Proposed Scheme. Wheeley Moor Farm Meadows LWS comprise semi-improved neutral grassland within the Cole floodplain. Cole Bank Park LWS is a narrow corridor of semi-natural habitats situated in the west bank of the river. The former is coincident with the section of river and its riparian zone identified as requiring habitat survey at chainage, the river is integral to the designated riparian habitats supported.
- 6.4.81 Due to access constraints no habitat survey data is available for the unnamed tributary watercourse of the River Cole (Volume 5: Map Books – Ecology, Map EC-10-109; G6). In the absence of field based assessment of habitat quality a review of OS mapping and aerial photography has identified that this watercourse is heavily modified and has poor planform likely to support only a limited range of habitats.
- 6.4.82 The unnamed tributary watercourse of the River Cole (Volume 5: Map Books – Ecology, Map EC-10-109; E6) is located within the boundary of the Coleshill Hall Farm LWS and recognised as an important component of the designated area.
- 6.4.83 Habitat surveys undertaken on the River Cole (Volume 5: Map Books – Ecology, Map EC-10-109; B6) have identified the river as being significantly to severely modified on account of the heavily engineered nature of the channel and the presence of major bridges and weirs (HMC: 5 and 4). The river supports a range of common aquatic and marginal plant species and its riparian zone relatively diverse including the presence of improved grassland and mixed woodland. FHS identified the river as supporting a range of habitats which were of moderate quality for coarse fish species. Even though heavily modified the River Cole at this location is clearly able to support a range of habitats and biotypes that appreciably enrich the local area.
- 6.4.84 Habitat surveys undertaken on the River Tame have identified the river as being severely modified as a result of the level of resectioning and bank reinforcement recorded at survey (HMC: 5). The river's riparian zone has variable character with sections of semi-improved grassland, mixed woodland and urban development noted. The semi-improved grassland recorded during the RCS (030-RS1-164001) is designated as a LWS (Coleshill Sewage Works Grassland). Although not in itself designated, the River Tame adjoins this site and is integral to the LWS's designation as it supports a relatively unmodified floodplain feature which is rare within the urban area and provides an important wildlife corridor. Aquatic and marginal macrophytes were abundant including a wide variety of emergent herb species and the FHS assessed moderate habitat quality due to the range of in-channel features and biotypes present. The Warwickshire Scarce (less than 10 county records) river water-

crowfoot was also recorded at survey. Even though heavily modified the River Tame at this location is clearly able to support a range of habitats and biotypes that appreciable enrich the local area and provides a major wildlife corridor.

- 6.4.85 A number of minor watercourses were screened out of requirement for habitat survey based on survey scoping criteria. However these are still likely to provide valuable wildlife corridors and habitats for aquatic species.

CFA20 Curdworth to Middleton

Desk study

- 6.4.86 The River Tame is the only main river within 100m of the land required for the construction of the Proposed Scheme in this area.
- 6.4.87 Other watercourses within 100m of land required for the construction of the Proposed Scheme include the Birmingham and Fazeley Canal, Gallows Brook, Langley Brook, two unnamed tributaries of the River Tame and six unnamed tributary watercourses of the Langley Brook.
- 6.4.88 Within this area the following watercourses have been identified which are crossed by the route of the Proposed Scheme:
- River Tame;
 - two unnamed tributary watercourses of the River Tame (Volume 5: Map Books – Ecology, Map EC-10-112; H6);
 - Birmingham and Fazeley Canal;
 - unnamed tributary watercourse of the Langley Brook (Volume 5: Map Books – Ecology, Map EC-10-113; F5);
 - unnamed tributary watercourse of the Langley Brook (Volume 5: Map Books – Ecology, Map EC-10-113; B6);
 - unnamed tributary watercourse of the Langley Brook (Volume 5: Map Books – Ecology, Map EC-10-114; F6);
 - unnamed tributary watercourse of the Langley Brook (Volume 5: Map Books – Ecology, Map EC-10-114; E6, currently within culvert under sports ground);
 - Langley Brook; and
 - Gallows Brook.
- 6.4.89 In addition, watercourses within 100m of the area of land required for the construction of the Proposed Scheme that will not crossed by the route include:
- unnamed tributary watercourse of the Langley Brook (Volume 5: Map Books – Ecology, Map EC-10-113; H4, 70m east of the route); and
 - unnamed tributary watercourse of the Langley Brook (Volume 5: Map Books – Ecology, Map EC-10-115; F4, 190m east of the route).
- 6.4.90 In addition to the route crossings, there is one road diversion which will result in the replacement of the existing A4091 road bridge over the Langley Brook (Volume 5:

Map Books – Ecology, Map EC-10-115; G4, 300m east of the route) with a wider overbridge to accommodate road widening. No footbridges have been identified that could potentially affect watercourses in this area.

- 6.4.91 Three watercourses in this area have been assessed as WFD water bodies within the Humber District River Basin Management Plan (RBMP). Specific information regarding the assessment of ecological elements of these water bodies is provided in Table 125.

Table 125: WFD ecological element assessment for CFA20

Watercourse	WFD water body name	WFD water body ID	Morphological designation	Ecological element assessed and status/potential
Birmingham and Fazeley Canal	Birmingham and Fazeley Canal upper section	GB70410515	AWB	<i>Moderate potential</i> No biology sites
Langley Brook	Langley Brook from Source to Middleton Hall Catch	GB104028046890	Not designated AWB/HMWB	<i>Poor status</i> Macro-invertebrates – poor Phytobenthos – poor Phosphate – bad
River Tame	River Tame from confluence of the two arms to River Blythe	GB104028046840	HMWB	Moderate potential Fish – poor Macro-invertebrates – bad Phosphate – poor

Notes: WFD = Water Framework Directive, AWB = Artificial Water Body, HMWB = Heavily Modified Water Body

- 6.4.92 All three water bodies listed have the objective of achieving good ecological potential/status by 2027.
- 6.4.93 Desktop Environment Agency RHS data is limited to the River Tame (Table 126) approximately 2km downstream of the Proposed Scheme crossing.

Table 126: Environment Agency RHS survey data by WFD water body for CFA20

Water body	WFD water body ID	Site name (Site ID) and NGR	Period of record (No. of records)	Details of most recent survey
River Tame	GB104028046840	(18222) SP 17361 91404	12 August 2005	Site located 2.07km upstream of the route crossing. Wetted width: 11m Water depth: 0.5m HMS: 3454; HMC: 5; HQA: 31; HQA Adjusted: 28

Notes: RCS = River Corridor Survey, RHS = River Habitat Survey, FHS = Fish Habitat Survey, HMS = Habitat Modification Score, HMC=Habitat Modification Class, HQA = Habitat Quality Assessment

- 6.4.94 RHS on the River Tame indicates the watercourse is severely modified (HMC: 5) at this location. The survey identifies the channel as realigned and over deepened for more than one third of the survey length. Substrate was recorded as predominantly gravel and flow types included rippled, smooth and unbroken wave indicating a limited range

of in channel habitat. Filamentous algae were recorded as extensive and submerged fine leaved plants as present within the survey reach.

- 6.4.95 Detailed Environment Agency aquatic ecological data is available for the River Tame only. Aquatic macrophyte data is reported for one site on the River Tame (Table 127) approximately 2.5km upstream of the Proposed Scheme crossing. Environment Agency aquatic invertebrate data is reported in the relevant baseline section below.

Table 127: Environment Agency aquatic macrophyte data by WFD water body for CFA20

Water body	WFD water body ID	Site name (Site ID) and NGR	Period of record (No. of records)	Details of most recent survey
River Tame	GB104028046840	Water Orton (47255) SP 16900 91400	19 July 2005 to 17 July 2006 (2)	Site located 2.55km upstream of the route crossing. MTR: 28.2; MFR: 2.13; RMNI: 8.1; RMHI: 7.62; N_ATAXA_R: 18; N_RFG: 11

Notes: MTR = Mean Trophic Rank, MFR = Mean Flow Rank, RMNI = River Macrophyte Nutrient Index, RMHI = River Macrophyte Hydraulic Index, N_ATAXA_R = Number of Aquatic Taxa, N_RFG = Number of Functional River Groups

- 6.4.96 Environment Agency macrophyte data for the River Tame at Water Orton (sampled in 2006) indicate the presence of species rich assemblage (N_ATAXA-R: 18) indicative of nutrient rich lowland systems (RMNI: 8.1). The MFR and RMHI score indicates the presence of a limited number of species associated with high flow velocities, with stream water-crowfoot (*Ranunculus penicillatus* ssp. *pseudofluitans*) being recorded.

Survey data

- 6.4.97 The following watercourses have been identified as requiring RCS, RHS and FHS:

- River Tame;
- Birmingham and Fazeley Canal;
- unnamed tributary watercourse of the Langley Brook (Volume 5: Map Books – Ecology, Map EC-10-113; F5);
- unnamed tributary watercourse of the Langley Brook (Volume 5: Map Books – Ecology, Map EC-10-113; B6);
- unnamed tributary watercourse of the Langley Brook (Volume 5: Map Books – Ecology, Map EC-10-114; F6);
- Langley Brook; and
- Gallows Brook.

- 6.4.98 RHS, RCS and FHS data are presented in Table 128.

- 6.4.99 No access has been obtained for the required survey areas on the unnamed tributary watercourses of the Langley Brook, as described in Table 112.

Table 128: Summary of habitat survey results for watercourses (including canals) for CFA20

Watercourse	Ecology survey code (survey date)	Survey type	Survey status	Survey results
River Tame (main river)	030-RS1-164001 (21 August 2012)	RCS	Complete	<p>030-RS1-164001 – (SP 18660 91820 to SP 19050 91510)</p> <p>A wide, heavily resectioned river, reinforced at u/s end. Macrophytes were abundant with approximately 50% total cover. Reed beds were abundant upstream of the railway bridge, but restricted to the shallow margins of the channel. The dominant grass species present was reed canary-grass with the submerged taxa dominated by fennel pondweed. Some small patches of river water-crowfoot were present amongst the stands of fennel pondweed. A wide variety of emergent herbs were also present at the margins, including water-cress, brooklime, water plantain, water-pepper and the non-native Himalayan balsam, which was abundant on both banks in this section.</p> <p>030-RS1-164002 – (SP 19070 91490 to SP 19490 91350)</p> <p>The Proposed Scheme crossing point is within this survey reach. A wide, heavily resectioned river. The banks appeared to be reinforced, with earth over the top of concrete. The channel was choked with vegetation, with approximately 80% macrophyte cover. The macrophytes were dominated by submerged fennel pondweed. Himalayan balsam was abundant on both banks in this section. Isolated emergent herbs and reeds were present in slower-flowing marginal areas, these included water plantain, water-pepper, reed canary-grass and pendulous sedge.</p>
	030-RS2-164001 (03 June 2013)			<p>030-RS2-164001 – (SP 19297 91418 to SP 19787 91205)</p> <p>HMS: 3550; HMC: 5; HQA: 36</p> <p>Wetted width: 21m</p> <p>Water depth: 0.3m</p> <p>Extensive resectioning of banks and channel, reinforcement of banks, a minor bridge and intermediate outfall contribute to a HMS of 3550, indicating a severely modified physical habitat structure. Gravel/pebble substrates dominate, with silt and sand also recorded. Smooth flows dominate with rippled flow also recorded. Very few macrophyte functional groups were represented. No features of special interest were recorded, although one discrete riffle, and eroding and stable cliffs were all recorded.</p> <p>030-RS2-164002 – (SP 19193 91433 to SP 18790 91727)</p> <p>HMS: 4105; HMC: 5; HQA: 35</p> <p>Wetted width: 21m</p> <p>Water depth: 0.5m</p> <p>The Proposed Scheme crossing point is within this survey reach. Extensive resectioning of banks and channel,</p>

Watercourse	Ecology survey code (survey date)	Survey type	Survey status	Survey results
				<p>reinforcement of banks, a number of bridges (including a major bridge) and minor outfall contribute to a HMS of 4105, indicating a severely modified physical habitat structure. Where visible, gravel/pebble and silt substrates dominate, with sand also recorded. Smooth flows dominate with rippled flow and upwelling also recorded. A number of macrophyte functional groups were represented. No features of special interest were recorded, although two discrete riffles were present.</p> <p><i>030-RS2-164003 – (SP 18789 91727 to SP 18342 91718)</i></p> <p>HMS: 3881; HMC: 5; HQA: 37</p> <p>Wetted width: 18m</p> <p>Water depth: 0.7m</p> <p>Extensive resectioning of banks and channel, reinforcement of banks and two major bridges contribute to a HMS of 3881, indicating a severely modified physical habitat structure. Silt substrates dominate, with gravel/pebble also recorded. Smooth flows dominate with rippled flow also recorded. A number of macrophyte functional groups were represented. No features of special interest were recorded, although two discrete riffles were present. Based on HQA score, this reach has the highest level of naturalness in its physical habitat, as compared with adjacent reaches surveyed.</p>
	030-FH1-164001 (03 June 2013)	FHS	Complete	<p><i>030-FH1-164001 – (SP 19787 91205 to SP 18342 91718)</i></p> <p>The Proposed Scheme crossing point is within this survey reach. Moderate cover for juvenile salmonid and coarse species. Poor spawning habitat for salmonids; moderate spawning habitat for rheophilic (spawn in gravel) and phytophilic (spawn on vegetation) coarse species.</p> <p>Overall habitat quality assessment –moderate, reasonable habitat variation with some substrate, flow and macrophyte diversity.</p>

Watercourse	Ecology survey code (survey date)	Survey type	Survey status	Survey results
Birmingham and Fazeley Canal (canal)	030-RS1-167001 (22 August 2012)	RCS	Complete	<p>030-RS1-167001 – (SP 18900 94150 to SP 19050 94320)</p> <p>An artificial water course with artificial banks and impounded flow. Turbidity was high in this section and two major locks were present. A towpath was present on the right bank with hawthorn hedges and mature trees including ash set back from the water. The only macrophytes present in the uniform channel were reed beds in areas of lower flow and sedimentation. The reed/grass species present were branched bur-reed, reed sweet-grass and common reedmace.</p>
	030-RS1-167002 (22 August 2012)			<p>030-RS1-167002 – (SP 19050 94320 to SP 19290 94810)</p> <p>The Proposed Scheme crossing point is within this survey reach. An artificial water course with artificial banks and impounded flow. Turbidity was high in this section, two road bridges and three major locks were present. Reed beds were present along most of the length of the left bank, dominated by branched bur-reed and reed sweet-grass. A large patch of fennel pondweed was present in a shallower section at the left bank and a single stand of water plantain. The middle of the channel was too deep and the water too turbid to support submerged macrophytes.</p>
	030-RS1-168001 (22 August 2012)			<p>030-RS1-168001 – (SP 19300 94830 to SP 19410 95060)</p> <p>An artificial water course with artificial banks and impounded flow. Turbidity was high in this section. A towpath was present on the right bank with hawthorn hedges and mature alder set back from the water on both sides. The only macrophyte present was a small patch of floating-leaved amphibious bistort (<i>Polygonum amphibium</i>). The section was too deep and turbid to support submerged plants, in addition to regular disturbance by boat traffic.</p>
	030-RS2-167001 (01 July 2013)	RHS	Complete	<p>030-RS2-167001 – (SP 18819 93883 to SP 18991 94243)</p> <p>HMS: 4646; HMC: 5; HQA: 24</p>
	030-RS2-167002 (01 July 2013)			<p>Wetted width: 9m</p> <p>Water depth: 0.5m</p>
	030-RS2-167003 (01 July 2013)			<p>Extensive reinforcement and resectioning of banks and channel, in addition to two minor bridges and a lock, contribute to a HMS of 4646, indicating a severely modified physical habitat structure. Substrate was not visible and flow was not perceptible. A number of macrophyte functional groups were represented. No bank or marginal features, or features of special interest were recorded. Based on HQA score, this reach has the highest level of naturalness in its physical habitat, as compared with adjacent reaches surveyed.</p>
				<p>030-RS2-167002 – (SP 19001 94257 to SP 19247 94711)</p> <p>HMS: 6170; HMC: 5; HQA: 17</p> <p>Wetted width: 10m</p>

Watercourse	Ecology survey code (survey date)	Survey type	Survey status	Survey results
				<p>Water depth: 0.7m</p> <p>The Proposed Scheme crossing point is within this survey reach. Extensive reinforcement and resectioning of banks and channel, in addition to a number of locks and a minor bridge, contribute to a HMS of 6170, indicating a severely modified physical habitat structure. Substrate was not visible and flow was not perceptible. Very few macrophyte functional groups were represented. No bank or marginal features, or features of special interest were recorded.</p> <p><i>030-RS2-167003 – (SP 19245 94713 to SP 19470 95211)</i></p> <p>HMS: 4790; HMC: 5; HQA: 22</p> <p>Wetted width: 11m</p> <p>Water depth: 0.6m</p> <p>Extensive reinforcement and resectioning of banks and channel, in addition to a minor bridge and a lock, contribute to a HMS of 4790, indicating a severely modified physical habitat structure. Substrate was not visible and flow was not perceptible. Very few macrophyte functional groups were represented. No bank or marginal features, or features of special interest were recorded.</p>
	030-FH1-167001 (01 July 2013)	FHS	Complete	<p><i>030-FH1-167001 – (SP 18819 93883 to SP 19470 95211)</i></p> <p>The Proposed Scheme crossing point is within this survey reach. Poor cover for juvenile salmonid and coarse species. Poor spawning habitat for coarse species and salmonids.</p> <p>Overall habitat quality assessment – poor, minimal habitat variation with little substrate, flow or macrophyte diversity.</p>
Langley Brook (ordinary watercourse)	030-RS1-171001 (10 May 2013)	RCS	Complete	<p><i>030-RS1-171001 – (SP 18420 98124 to SP 18670 98134)</i></p> <p>The Proposed Scheme crossing point is within this survey reach. A straightened farmland stream with a sandy substrate and eroding sandy cliffs. Riffles and pools were present and overhanging trees for most of the section. Marshy grassland was present at the downstream end of this section, characterised by abundant soft-rush (<i>Juncus effusus</i>). A large section of the brook was dominated by submerged water-crowfoot. Reed beds were present at the downstream end, dominated by reed canary-grass and branched bur-reed. The non-native Himalayan balsam was present on both banks.</p>

Watercourse	Ecology survey code (survey date)	Survey type	Survey status	Survey results
	030-RS2-171001 (10 May 2013)	RHS	Complete	<p>030-RS2-171001 – (SP 18422 98125 to SP 18725 98136)</p> <p>HMS: 320; HMC: 3; HQA: 35</p> <p>Wetted width: 2m</p> <p>Water depth: 0.25m</p> <p>The Proposed Scheme crossing point is within this survey reach. Resectioning of banks has contributed to a HMS of 320, indicating an obviously modified physical habitat structure. Sand substrates dominate, with gravel/pebble also recorded. Rippled, smooth and upwelling flows were all recorded, with extensive emergent reeds and a number of other macrophyte functional groups noted. Two pools, two riffles, a number of flow types and stable cliffs all appreciably enrich the riverine habitat.</p>
	030-FH1-171001 (10 May 2013)	FHS	Complete	<p>030-FH1-171001 – (SP 18422 98125 to SP 18725 98136)</p> <p>The Proposed Scheme crossing point is within this survey reach. Moderate cover for juvenile salmonid and coarse species. Moderate spawning habitat for salmonids and rheophilic coarse species; good spawning habitat for phytophilic coarse species.</p> <p>Overall habitat quality assessment –good; good habitat variation with high substrate, flow and macrophyte diversity.</p>
Gallows Brook (ordinary watercourse)	030-RS1-172001 (13 May 2013) 030-RS1-172002 (13 May 2013)	RCS	Complete	<p>030-RS1-172001 – (SP 17693 99171 to SP 17986 99057)</p> <p>The Proposed Scheme crossing point is within this survey reach. A narrow farmland watercourse, straightened along the field edge with both banks resectioned. This section was 90% shaded by trees and scrub overhanging from the right bank with few macrophytes present. Small patches of reeds were present in an un-shaded area, dominated by reed canary-grass. Small patches of emergent herbs were also present across the channel in these areas, including great willowherb and water mint.</p> <p>030-RS1-172002 – (SP 17985 99058 to SP 18380 98978)</p> <p>A narrow farmland watercourse, straightened along the field edge with both banks resectioned. This section was less shaded (<60%) with more macrophyte growth. Emergent herbs were present throughout the shallow channel with abundant fool's water-cress, great willowherb and water-cress. No reeds were present in this section.</p>

Watercourse	Ecology survey code (survey date)	Survey type	Survey status	Survey results
	030-RS2-172001 (13 May 2013) 030-RS2-172002 (13 May 2013)	RHS	Complete	<p><i>030-RS2-172001 – (SP 17693 99171 to SP 18074 99054)</i></p> <p>HMS: 2890; HMC: 5; HQA: 24</p> <p>Wetted width: 0.8m</p> <p>Water depth: 0.1m</p> <p>The Proposed Scheme crossing point is within this survey reach. Complete resectioning of both banks and channel contribute to a HMS of 2890, indicating a severely modified physical habitat structure. Silt substrate and smooth flows dominate, with very few macrophyte functional groups represented. Based on HQA score, this reach has the higher level of naturalness in its physical habitat, as compared with the adjacent reach surveyed.</p> <p><i>030-RS2-172002 – (SP 18074 99054 to SP 18380 98980)</i></p> <p>HMS: 2260; HMC: 5; HQA: 22</p> <p>Wetted width: 0.8m</p> <p>Water depth: 0.05m</p> <p>Complete resectioning of both banks and channel contribute to a HMS of 2260, indicating a severely modified physical habitat structure. Silt substrate and smooth flows dominate, with very few macrophyte functional groups represented.</p>
	030-FH1-172001 (13 May 2013)	FHS	Complete	<p><i>030-FH1-172001 – (SP 17693 99171 to SP 18380 98980)</i></p> <p>Poor cover for juvenile salmonid species; moderate cover for phytophilic coarse species. Poor spawning (e.g. gravel) habitat for rheophilic coarse species and salmonids; moderate spawning habitat (e.g. in channel vegetation) for phytophilic coarse fish.</p> <p>Overall habitat quality assessment – poor, minimal habitat variation with little substrate, flow or macrophyte diversity.</p>

Notes: RCS = River Corridor Survey, RHS = River Habitat Survey, FHS = Fish Habitat Survey, HMS = Habitat Modification Score, HMC=Habitat Modification Class, HQA = Habitat Quality Assessment

- 6.4.100 None of the watercourses within 100m of the land required for the construction of the route in this area have statutory or non-statutory designations. Rivers and streams are identified as habitats of principal importance. The Warwickshire, Coventry and Solihull LBAP lists rivers and streams as priority habitats and their aims regarding these include: ensuring the quality of watercourses and their corridors do not deteriorate; and enhancing those watercourses supporting species of principal importance or Red Data Book species.
- 6.4.101 Habitat surveys undertaken on the River Tame have identified the river as being severely modified as a result of the level of resectioning and bank reinforcement recorded at survey (HMC: 5). The river's riparian zone has variable character with sections of semi-improved grassland, mixed woodland and urban development noted. The semi-improved grassland recorded during the RCS (030-RS1-164001) is designated as Coleshill Sewage Works Grassland LWS. Although not in itself designated, the River Tame adjoins this site and is integral to the LWS designation as it supports a relatively unmodified floodplain feature which is rare within the urban area and provides an important wildlife corridor. Aquatic and marginal macrophytes were abundant including a wide variety of emergent herb species and the FHS assessed moderate habitat quality due to the range of in-channel features and biotypes present. Even though heavily modified the River Tame at this location clearly supports a range of habitats and biotypes that appreciably enrich the local area.
- 6.4.102 Habitat surveys conducted on the Birmingham and Fazeley Canal have identified low macrophyte abundance and diversity in turbid conditions with no perceptible flows. The physical habitat is described as being significantly modified (HMC: 5). FHS identified poor habitat quality for fish species as a result of the limited diversity in the biotypes supported by this watercourse. However, the watercourse is considered to still provide a valuable wildlife corridor.
- 6.4.103 Habitat surveys conducted on the Langley Brook have shown the watercourse to be obviously modified (HMC: 3), due to historical resectioning. However the watercourse supports a relatively diverse range of habitats and biotypes for its size, with numerous flow and substrate types recorded, in addition to several macrophyte functional groups and discrete features including riffles and stable cliffs. FHS has identified moderate and good habitat quality for juvenile and spawning salmonid and coarse fish life stages. The Langley Brook also feeds Middleton Pool Site of Special Scientific Interest (SSSI) and Local nature Reserve (LNR), downstream of the watercourse assessment area (i.e. outside 100m of the area of land required for construction of the Proposed Scheme). Due to the range of habitat and biotypes supported by the Langley Brook, and its importance in maintaining Middleton Pool SSSI (refer to Section 2 for further designated site details).
- 6.4.104 Habitat surveys conducted on the Gallows Brook have identified low macrophyte, flow and substrate diversity in a significantly modified channel (HMC: 5). FHS identified poor habitat quality for fish species as a result of the limited diversity in the biotypes supported by this watercourse. However, the watercourse is considered to still provide a valuable wildlife corridor.

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- 6.4.105 The Black Brook is the only main river within 100m of the area of land required for the construction of the Proposed Scheme in this area. It is termed the Black-Bourne Brook by the Environment Agency for WFD assessment purposes.
- 6.4.106 Other watercourses within 100m of the area of land required for the construction of the Proposed Scheme include the Gallows Brook, two unnamed tributary watercourses of the River Tame, three unnamed tributary watercourses of the Bourne Brook and one unnamed tributary watercourse of the Black Brook.
- 6.4.107 Of these watercourses, the following have been identified as being crossed by the route of the Proposed Scheme:
- Gallows Brook;
 - two unnamed tributary watercourses of the Tame (Volume 5: Map Books – Ecology, Map EC-10-116; C6);
 - unnamed tributary watercourse of the Bourne Brook (Volume 5: Map Books – Ecology, Map EC-10-118; D6);
 - unnamed tributary watercourse of the Bourne Brook (Volume 5: Map Books – Ecology, Map EC-10-118; B6); and
 - Black Brook.
- 6.4.108 Watercourses within 100m of the area of land required for the construction of the Proposed Scheme that will not be crossed by the Proposed Scheme rail route include an unnamed tributary watercourse of the Bourne Brook (Volume 5: Map Books – Ecology, Map EC-10-118; G6, 30m east of the route) and an unnamed tributary watercourse of the Black Brook (Volume 5: Map Books – Ecology, Map EC-10-120; A8, 200m west of the route).
- 6.4.109 In addition to the route crossings, the diversion of Shirral Drive will result in the crossing (at Volume 5: Map Books – Ecology, Map EC-10-117; F7, 100m west of the route) of the unnamed tributary watercourse of the River Tame (Volume 5: Map Books – Ecology, Map EC-10-116; C6).
- 6.4.110 The unnamed tributary watercourses of the Tame (Volume 5: Map Books – Ecology, Map EC-10-116; C6) converge to the east of the route of the Proposed Scheme. Following this confluence, the watercourse is assessed as part of the Langley Brook water body under the WFD, though the Langley Brook itself is further south and not within this area.
- 6.4.111 Both the Langley Brook and Black – Bourne Brook fall within the Humber District River Basin Management Plan (RBMP). Specific information regarding the assessment of their ecological elements is provided in Table 129.

Table 129: WFD ecological element assessment for CFA21

Watercourse	WFD water body name	WFD water body ID	Hydromorphological designation	Ecological element assessed and status/potential
Langley Brook (downstream of the confluence of two unnamed tributaries of the R Tame)	Langley Brook from Middleton Hall Catch to R Tame	GB104028046900	Not designated AWB/HMWB	<i>Poor status</i> Macro-invertebrates – moderate Phytobenthos – poor Phosphate – bad
Black – Bourne Brook	Black – Bourne Bk from source (confluence) to R Tame	GB104028047000	Not designated AWB/HMWB	<i>Poor status</i> Fish – moderate Macro-invertebrates – poor Phosphate – bad

Notes: WFD = Water Framework Directive, AWB = Artificial Water Body, HMWB = Heavily Modified Water Body

6.4.112 Both the Langley Brook and Black – Bourne Brook are currently assessed as having poor ecological status with objectives of good ecological status by 2027.

6.4.113 Desktop Environment Agency RHS data are available for the Black Brook, in the immediate vicinity of the Proposed Scheme rail route crossing (Table 130).

Table 130: Environment Agency RHS survey data by WFD water body for CFA21

Watercourse	WFD water body name	Site ID (NGR)	Period of record (No. of records)	Details of most recent survey
Black Brook	GB104028047000	19994 (SK 15017 03519)	30 August 2007 (1)	Site located at the route crossing. HMS: 3510, HMC: 5, HQA:36, HQA Adjusted: 33

Notes: RCS = River Corridor Survey, RHS = River Habitat Survey, FHS = Fish Habitat Survey, HMS = Habitat Modification Score, HMC=Habitat Modification Class, HQA = Habitat Quality Assessment

6.4.114 The RHS data identifies the watercourse at this location as being severely modified (HMC: 5) through extensive resectioning of both banks and channel, and over-deepening.

6.4.115 No proximal Environment Agency macrophyte data was available for any watercourse within this area.

Survey data

6.4.116 The following watercourses have been identified as requiring RCS, RHS and Fish Habitat Survey (FHS):

- Gallows Brook;
- two unnamed tributary watercourses of the Tame (Volume 5: Map Books – Ecology, Map EC-10-116; C6);
- unnamed tributary watercourse of the Bourne Brook (Volume 5: Map Books – Ecology, Map EC-10-118; D6);
- Black Brook; and
- unnamed tributary watercourse of the Black Brook (not crossed but within

100m of land required for the construction of the Proposed Scheme at Volume 5: Map Books – Ecology, Map EC-10-120; A8, 200m west of the route).

- 6.4.117 Available RHS, RCS and FHS data are presented in Table 130.
- 6.4.118 No access has been obtained for the required survey area on an unnamed tributary watercourse of the Tame and the unnamed tributary watercourse of the Black Brook as described in Table 112.

Table 131: Summary of habitat survey results for watercourses (including canals) for CFA21

Watercourse type – name	Survey references (survey date)	Survey type	Survey status	Survey results
Gallows Brook (ordinary watercourse)	030-RS1-172001 (13 May 2013) 030-RS1-172002 (13 May 2013)	RCS	Complete	<p><i>030-RS1-172001 – (SP 17693 99171 to SP 17986 99057)</i></p> <p>A narrow farmland watercourse, straightened along the field edge with both banks resectioned. This section was 90% shaded by trees and scrub overhanging from the right bank with few macrophytes present. Small patches of reeds were present in an un-shaded area, dominated by reed canary-grass. Small patches of emergent herbs were also present across the channel in these areas, including great willowherb and water mint. The Proposed Scheme crossing point is within this survey reach.</p> <p><i>030-RS1-172002 – (SP 17985 99058 to SP 18380 98978)</i></p> <p>A narrow farmland watercourse, straightened along the field edge with both banks resectioned. This section was less shaded (<60%) with more macrophyte growth. Emergent herbs were present throughout the shallow channel with abundant fool's water-cress, great willowherb and water-cress. No reeds were present in this section.</p>
	030-RS2-172001 13 May 2013 030-RS2-172002 13 May 2013	RHS	Complete	<p><i>030-RS2-172001 – (SP 17693 99171 to SP 18074 99054)</i></p> <p>HM: 2890; HMC: 5; HQA: 24</p> <p>Wetted width: 0.8m</p> <p>Water depth: 0.1m</p> <p>The Proposed Scheme crossing point is within this survey reach. Complete resectioning of both banks and channel contribute to a HMS of 2890, indicating a severely modified physical habitat structure. Silt substrate and smooth flows dominate, with very few macrophyte functional groups represented. Based on HQA score, this reach has the higher level of naturalness in its physical habitat, as compared with the adjacent reach surveyed.</p> <p><i>030-RS2-172002 – (SP 18074 99054 to SP 18380 98980)</i></p> <p>HMS: 2260; HMC:5; HQA: 22</p> <p>Wetted width: 0.8m</p> <p>Water depth: 0.05m</p> <p>Complete resectioning of both banks and channel contribute to a HMS of 2260, indicating a severely modified physical habitat structure. Silt substrate and smooth flows dominate, with very few</p>

Watercourse type – name	Survey references (survey date)	Survey type	Survey status	Survey results
				macrophytes represented.
	030-FH1-172001 13 May 2013	FHS	Complete	<p><i>030-FH1-172001 – (SP 17693 99171 to SP 18380 98980)</i></p> <p>Poor cover for juvenile salmonid species; moderate cover for phytophilic coarse species. Poor spawning (e.g. gravel) habitat for rheophilic coarse species and salmonids; moderate spawning habitat (e.g. in channel vegetation) for phytophilic coarse fish.</p> <p>Overall habitat quality assessment – poor, minimal habitat variation with little substrate, flow or macrophyte diversity.</p>
Unnamed tributary watercourse of the Tame (Volume 5: Map Books – Ecology, Map EC-10-116; C6) (ordinary watercourse)	030-RS1-173001 13 May 2013 030-RS1-173002 13 May 2013	RCS	Complete	<p><i>030-RS1-173001 – (SP 17780 99550 to SP 18030 99430)</i></p> <p>A small, shallow, heavily shaded watercourse along the edge of farmland. This section was historically resectioned but has recovered, with a natural riffle/pool structure. Willow tree roots have led to deposition of sediment and the formation of recovery berms. Alder and white willow were abundant on the bankside, in channel and on the banktop. Despite heavy shading, small patches of macrophytes were present throughout the section, dominated by fool's water-cress.</p> <p><i>030-RS1-173002 – (SP 17418 99588 to SP 17761 99561)</i></p> <p>A small, shallow heavily shaded watercourse along the edge of farmland. This section was historically resectioned but has recovered, with a natural riffle/pool structure and gravel substrate. The channel was heavily shaded with isolated patches of fool's water-cress and great willowherb. Side bars, berms and coarse woody debris were abundant throughout the reach. The Proposed Scheme crossing point is within this survey reach.</p>

Watercourse type – name	Survey references (survey date)	Survey type	Survey status	Survey results
	030-RS2-173001 13 May 2013	RHS	Complete	<p>030-RS2-173001 – (SP 17418 99580 to SP 17761 99561)</p> <p>HMS: 2240; HMC: 5; HQA: 35</p> <p>Wetted width: 0.6m</p> <p>Water depth: 0.05m</p> <p>The Proposed Scheme crossing point is within this survey reach. Extensive resectioning of both banks and channel contribute to a HMS of 2240, indicating a severely modified physical habitat structure. However, variation in both substrate (gravel-pebble and silt) and flow (rippled, smooth and upwelling) types recorded, as well as two distinct riffle features appreciably enrich the riverine habitat. Very few macrophyte functional groups are represented.</p>
	030-FH1-173001 13 May 2013	FHS	Complete	<p>030-FH1-173001 – (SP 174189 9588 to SP 17761 99561)</p> <p>Moderate cover for juvenile salmonid and coarse species. Poor spawning habitat for phytophilic coarse species and salmonids; moderate spawning habitat for rheophilic coarse fish.</p> <p>Overall habitat quality assessment – moderate, limited substrate and macrophyte diversity but some variation in flow types.</p>
Black Brook (main river)	030-RS1-177004 14 May 2013 030-RS1-177005 14 May 2013 030-RS1-173006 14 May 2013	RCS	Complete	<p>030-RS1-177004 – (SK 14745 03509 to SK 15121 03483)</p> <p>A semi-natural river in flat-bottomed bowl valley. This section had abundant side bars and submerged tree roots in the channel. The upstream section had reinforced banks along the edge of gardens. The dominant plant species was submerged water starwort with some small patches of horned pondweed (<i>Zannichellia palustris</i>). Some small areas of reed canary-grass were present on the bankside and in the margins. Marshy grassland was present on the left and right bank characterised by abundant soft-rush.</p> <p>030-RS1-177005 – (SK 15121 03483 to SK 15348 03140)</p> <p>This section was heavily shaded by mature trees, including white willow and alder. The wet woodland area at the downstream end was dominated by white willow. The channel was much wider and slower flowing at the downstream end with a sandy substrate. Macrophyte growth was sparse in this section, with isolated beds of reed canary-grass and a single large patch of non-native Nuttall's pondweed. A side channel/drain was present on the right bank with diverse macrophyte growth.</p> <p>030-RS1-177006 – (SK 15348 03140 to SK 15605 02915)</p>

Watercourse type – name	Survey references (survey date)	Survey type	Survey status	Survey results
				This section was a semi-natural channel through water meadow and wet woodland. In the upstream section there were multiple fallen trees, pools and a side channel. However, it was heavily resectioned and engineered through woodland at the downstream end, flowing into an artificial backwater and through a culvert under a road. Macrophytes were sparse, with small patches of spiked water-milfoil and great yellow-cress (<i>Rorippa amphibia</i>).
	030-RS2-177002 14 May 2013 030-RS2-177003 14 May 2013 030-RS2-177004 14 May 2013	RHS	Complete	<p>030-RS2-177002 – (SK 14745 03507 to SK 15121 03483)</p> <p>HMS: 740; HMC: 4; HQA: 40</p> <p>Wetted width: 3m</p> <p>Water depth: 0.6m</p> <p>The Proposed Scheme crossing point is within this survey reach. Extensive resectioning of both banks and channel, as well as intermediate and minor weirs and bridges contribute to a HMS of 740, indicating a significantly modified physical habitat structure. However, variation in both substrate (gravel-pebble and sand) and flow types (rippled and smooth) recorded, as well as diversity in macrophyte groups represented appreciably enrich the riverine habitat. A number of special features including leaf debris dams and water meadows were also recorded in this survey.</p> <p>030-RS2-177003 – (SK15121 03483 to SK 15349 03140)</p> <p>HMS: 25; HMC: 2; HQA: 42</p> <p>Wetted width: 6m</p> <p>Water depth: 0.5m</p> <p>A minor outfall/intake was the only modification recorded, resulting in a HMS of 25, indicating a predominantly unmodified physical habitat structure. Sand substrate and smooth flows dominate, with a number of macrophyte groups represented. A side bar, eroding cliffs, leafy debris and water meadow features all appreciably enrich the riverine habitat.</p> <p>030-RS2-177004 – (SK 15348 03140 to SK 15605 02915)</p> <p>HMS: 65; HMC: 2; HQA: 47</p> <p>Wetted width: 6m</p> <p>Water depth: 0.5m</p>

Watercourse type – name	Survey references (survey date)	Survey type	Survey status	Survey results
				A minor outfall/intake and small section of reinforced bank were the only modifications recorded, resulting in a HMS of 65, indicating a predominantly unmodified physical habitat structure. Sand and silt channel substrates, and smooth and rippled flows dominate. Side channels, leafy debris, a distinct pool feature, water meadows, and eroding cliff features all appreciably enrich the riverine habitat. Based on HQA score, this reach has the highest level of naturalness in its physical habitat, as compared with adjacent reaches surveyed.
	030-FH1-177002 14 May 2013	FHS	Complete	<p>030-FH1-177002 – (SK 14745 03507 to SK 15605 02913)</p> <p>Moderate cover for juvenile salmonid and coarse species. Poor spawning habitat for salmonids; moderate spawning habitat for rheophilic and phytophilic coarse species.</p> <p>Overall habitat quality assessment – moderate; some diversity in substrate, macrophyte and flow types.</p>
Unnamed tributary watercourse of the Black Brook (Volume 5: Map Books – Ecology, Map EC-10-120; A8, 200m west of the route) (ordinary watercourse)	030-RS1-177003 14 May 2013	RCS	Complete	<p>030-RS1-177003 – (SK 14791 03734 to SK 14824 03540)</p> <p>This tributary of the Black Brook was a semi-natural resectioned stream at the upstream end, but heavily modified with gabion baskets downstream. The stream flowed through residential areas and gardens. Flow was negligible through much of the reach with terrestrial plants growing in the channel. No macrophytes were present and banks were planted and mown.</p>
	030-RS2-177001 14 May 2013	RHS	Complete	<p>030-RS2-177001 – (SK 14791 03734 to SK 14824 03540)</p> <p>HMS: 2770; HMC:5; HQA: 13</p> <p>Wetted width: 0.8m</p> <p>Water depth: 0.05m</p> <p>Three major culverts, two minor bridges, and associated bank and channel resectioning and reinforcement contribute to a HMS of 2770, indicating a severely modified physical habitat structure. The channel was recorded as dry at one spot-check, with no perceptible flow observed in other sections. Where visible, gravel-pebble substrate was recorded as dominant.</p>

Watercourse type – name	Survey references (survey date)	Survey type	Survey status	Survey results
	030-FH1-177001 14 May 2013	FHS	Complete	<p>030-FH1-177001 – (SK14791 03734 to SK 1482403540)</p> <p>Poor cover for juvenile salmonid and coarse species. Poor spawning habitat for salmonids, as well as rheophilic and phytophilic coarse species.</p> <p>Overall habitat quality assessment – poor; very shallow, dry in places, with little substrate or flow diversity.</p>

Notes: RCS = River Corridor Survey, RHS = River Habitat Survey, FHS = Fish Habitat Survey, HMS = Habitat Modification Score, HMC=Habitat Modification Class, HQA = Habitat Quality Assessment

- 6.4.119 None of the watercourses within 100m of the area of land required for the construction of the Proposed Scheme in this area have statutory designations. The Staffordshire LBAP lists rivers and streams as priority habitats and their aims regarding these include: ensuring the quality of watercourses and their corridors do not deteriorate; and enhance those watercourses supporting species of principal importance or Red Data Book species.
- 6.4.120 The two types of non-statutory Local Wildlife Site (LWS) in Staffordshire: Sites of Biological Importance (SBI) and Biodiversity Alert Sites (BAS). The following three stretches of the Black – Bourne Brook, its riparian corridor and associated woodland/wetland habitats have BAS designations:
- Black Brook Corridor: B.B. Bridge to Heart of England Way;
 - Ford (Oxbow Woodland) to Botley House, Bourne Brook Corridor; and
 - Botley House to Bourne Bridge, Bourne Brook.
- 6.4.121 The Black Brook Corridor: B. B. Bridge to Heat of England Way BAS citation, which will be crossed by the route of the Proposed Scheme, is described in the BAS citation as “a small, relatively slow flowing gravel and pebble bed river. Riffles and glides were frequent however other features such as sediment bars and eroding earth cliffs were absent. The bank tops are lined with a band of ruderal vegetation and alders are scattered along both sides of the brook. Water crowfoot was abundant in the channel.”
- 6.4.122 Habitat surveys were largely in accord with the citation, and also identified a number of notable features including leaf debris dams, eroding cliffs, pools, associated water meadows, and side bars. Horned pondweed was also recorded at survey and is Rare in Staffordshire (occurs at between 9-38 tetrads in the county).
- 6.4.123 Habitat surveys undertaken on the unnamed tributary watercourse of the Black Brook (Volume 5: Map Books – Ecology, Map EC-10-120; A8, 200m west of the route) confirmed that the watercourse is heavily modified and resectioned, with no macrophytes and a marginal habitat dominated by terrestrial flora. Flows were often non-perceptible and banks were mown throughout the survey length. Though a tributary of the Black – Bourne Brook (designated as a BAS), the intrinsic ecological value of this tributary is limited.
- 6.4.124 Habitat surveys on the Gallows Brook have identified the heavily modified nature of the watercourse (HMC: 5 indicates a significantly modified system). The Gallows Brook has been straightened and resectioned throughout, and the reach surveyed supports only commonly occurring aquatic macrophyte species e.g. reed canary-grass and water mint, with silt substrate dominant and low flow diversity. The Proposed Scheme crossing point supports habitats and biotypes typical of the survey reach with trees and shrubs lining both banks. Although a limited range of habitats and biotypes supported, the watercourse provides a valuable wildlife corridor in an otherwise predominantly arable landscape.
- 6.4.125 Habitat surveys on the unnamed tributary watercourse of the Tame (Volume 5: Map Books – Ecology, Map EC-10-116; C6) have identified the habitat as recovered from historical resectioning, with a natural riffle/pool structure. Side bars, natural berms,

woody debris and variation in flow types all appreciably enrich the riverine habitat. Immediately downstream of the confluence with the other unnamed tributary of the Tame (Volume 5: Map Books – Ecology, Map EC-10-116; C6) covered by this area, the watercourse becomes WFD assessed, as part of the Langley Brook (from Middleton Hall Catch to R Tame) (GB104028046900) water body.

- 6.4.126 Access constraints have prevented survey of the unnamed tributary watercourse of the Tame (Volume 5: Map Books – Ecology, Map EC-10-116; C6) and the unnamed tributary watercourse of the Bourne Brook (Volume 5: Map Books – Ecology, Map EC-10-118; D6). However, review of OS mapping and aerial photography shows that these minor watercourses have poor planform, having been historically straightened. The unnamed tributary of the Tame is crossed by the A453 and another minor road (Shirrall Drive), and has a ninety degree bend in its alignment, suggesting it has been heavily modified throughout. Only a limited range of habitats are likely to be supported within these modified watercourses.

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- 6.4.127 Main rivers within 100m of the land required for the construction of the Proposed Scheme include an unnamed tributary watercourse of the Mare Brook and Curborough Brook.
- 6.4.128 Other watercourses within 100m of the land required for the construction of the Proposed Scheme include the Trent and Mersey Canal, Wyrley and Essington Canal, Curborough Brook, Bourne Brook, Mare Brook and a number of unnamed tributary watercourses.
- 6.4.129 Within this area the following watercourses are crossed by the route of the Proposed Scheme:
- unnamed tributary watercourse of the Fisherwick Brook (Volume 5: Map Books – Ecology, Map EC-10-124; D6);
 - Wyrley and Essington Canal (disused canal);
 - unnamed tributary watercourse of the Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-125; G6);
 - Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-126; H3);
 - Trent and Mersey Canal;
 - Curborough Brook;
 - Bourne Brook;
 - unnamed tributary watercourse of the Mare Brook (current river alignment crossing at Volume 5: Map Books – Ecology, Map EC-10-126; D4). Watercourse will be realigned under the Proposed Scheme; and
 - unnamed watercourse network of which parts are currently culverted (Volume 5: Map Books – Ecology, Map EC-10-130; G6; Map EC-10-130; F6; and Map EC-10-130; E6).

- 6.4.130 Watercourses within 100m of the land required for the construction of the Proposed Scheme that are not crossed by the route:
- Coventry Canal; and
 - unnamed tributary watercourse of the Pyford Brook (Volume 5: Map Books – Ecology, Map EC-10-128; C6).
- 6.4.131 No other watercourse crossings (e.g. road diversions) have been indentified in this area.
- 6.4.132 Three WFD assessed water bodies (watercourses) within the Humber River Basin Management Plan (RBMP) and one within the Severn RBMP, namely the Coventry Canal, fall within this area. Specific information regarding the WFD assessment of ecological elements of these water bodies is provided in Table 132.

Table 132: WFD ecological element assessment for CFA22

Watercourse	WFD water body name	WFD water body ID	Morphological designation	Ecological element assessed and status/potential
Coventry Canal (includes the disused Wyrley and Essington Canal)	Coventry and Ashby Canals	GB70910212	AWB	Good potential No biology data
Trent and Mersey Canal	Trent and Mersey Canal, summit to Alrewas	GB70410142	AWB	Good potential No biology data
Curborough Brook	Pyford Brook Catchment (trib of Trent)	GB104028047250	HMWB	Moderate potential Macro-invertebrates – bad
Bourne Brook	Bourne-Bilson Brook Catchment (trib of Trent)	GB104028047270	Not designated AWB/HMW	Good status Macro-invertebrates – good

Notes: WFD = Water Framework Directive, AWB = Artificial Water Body, HMWB = Heavily Modified Water Body

- 6.4.133 Of the four WFD water body watercourses with status assessments identified in this area; all have the objective of reaching good ecological status/potential by 2027. Both the Coventry Canal and Trent and Mersey Canal are assessed as currently having good ecological potential. The Bourne Brook is assessed as having good status, with its aquatic invertebrate element assessed as good. The Curborough Brook is assessed as currently having moderate potential and is limited by aquatic invertebrates, ammonia, dissolved oxygen and phosphate.
- 6.4.134 No Environment Agency RHS survey data is available for the WFD water bodies.
- 6.4.135 No Environment Agency aquatic ecological survey data is available for the Coventry Canal (GB70910212) or the Trent and Mersey Canal (GB70410142).

Survey data

- 6.4.136 The following watercourses within this area were identified as requiring RHS, RCS and FHS:
- unnamed tributary watercourse of the Fisherwick Brook (Volume 5: Map Books – Ecology, Map EC-10-124; D6);

- Wyrley and Essington Canal (disused);
- unnamed tributary watercourse of the Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-125; G6);
- Coventry Canal;
- Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-126; H3);
- unnamed tributary watercourse of the Mare Brook (current river alignment crossing at Volume 5: Map Books – Ecology, Map EC-10-126; D4);
- Trent and Mersey Canal;
- Curborough Brook; and
- Bourne Brook.

6.4.137 Available RHS, RCS and FHS data are presented in Table 133.

6.4.138 No access has been obtained for the required survey areas on the Wyrley and Essington Canal, unnamed tributary of Fisherwick Brook (Volume 5: Map Books – Ecology, Map EC-10-124; D6), an unnamed tributary watercourse of the Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-126; D4), and the Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-126; H3) as described in Table 112.

Table 133: Summary of habitat survey results for watercourses (including canals) for CFA22

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
Wyrley and Essington Canal (canal)	030-RS1-183002 (16 May 2013)	RCS	Incomplete. Access to section to the east of the rail route only.	<p>030-RS1-183002 – (SK 15133 09499 to SK 15001 09346)</p> <p>A disused canal section with no flow terminating at a small boatyard. Turbidity high and the channel completely artificial with multiple boat moorings. Macrophytes limited to a small stand of reeds close to bridge abutments. Species present included lesser pond-sedge (<i>Carex acutiformis</i>), branched bur-reed and reed canary-grass.</p> <p>Canal was lined with occasional mature trees e.g. English oak (<i>Quercus robur</i>) and semi-continuous shrubs with adjoining land being dominated by improved grassland.</p> <p>Proposed crossing point is coincident with an in-filled location on the canal. Survey reach therefore describes character of watercourse in proximity to crossing point.</p>
	030-RS2-183001 (15 May 2013)	RHS	Incomplete. Access to section to the east of the rail route only.	<p>030-RS2-183001 – (SK 14796 09179 to SK 15001 09346)</p> <p>HMS 2720; HMC: 5; HQA: 18</p> <p>Wetted width: 8m</p> <p>Water depth: 1.5m</p> <p>The presence of bank reinforcement, channel resectioning and a minor bridge contribute to a HMS of 2720, and an HMC of 5 (severely modified).</p> <p>Proposed crossing point is coincident with an in-filled location on the canal. Survey reach therefore describes character of watercourse in proximity to crossing point.</p>
	030-FH1-183001 (15 May 2013)	FHS – 0.6km	Incomplete. Access to section to the east of the rail route only.	<p>030-FH1-183001 – (SK 14796 09178 to SK 15001 09346)</p> <p>Poor cover for juvenile coarse and salmonid species. Poor spawning habitat for rheophilic (spawn on gravels) and phytophilic (spawn on vegetation) coarse species and salmonid species.</p> <p>Deep water habitat type identified as dominant with silt substrate.</p> <p>Overall habitat quality assessment – poor, canal section with little substrate, flow or habitat diversity.</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
Coventry Canal (canal)	030-RS1-184001 (16 May 2013)	RCS	Complete	<p>030-RS1-184001 – (SK 14929 09987 to SK 14858 10335)</p> <p>A man-made watercourse with sheet-piled banks, impounded flow and high turbidity. In-channel vegetation was limited to marginal reed beds of common reed, yellow iris (<i>Iris pseudacorus</i>) and reed sweet-grass. These species were also found on the bank top at the edge of the towpath. Lined by semi-continuous and occasional mature trees e.g. English oak and ash and shrubs.</p> <p>Survey reach located within 100m of the area of land required for the construction of the Proposed Scheme, but not crossed.</p>
	030-RS2-184001 (15 May 2013)	RHS	Complete	<p>030-RS2-184001 – (SK 14929 09987 to SK 14858 10335)</p> <p>HMS 3110; HMC: 5; HQA: 21</p> <p>Wetted width: 8m</p> <p>Water depth: 1.8m</p> <p>The presence of bank reinforcement, channel resectioning and a minor bridge contribute to a HMS of 3110, and an HMC of 5 (severely modified).</p> <p>Proposed crossing point is coincident with an in-filled location on the canal. Survey reach therefore describes character of watercourse in proximity to crossing point.</p>
	030-FH1-184001 (15 May 2013)	FHS	Complete	<p>030-FH1-184001 – (SK 14929 09987 to SK 14858 10335)</p> <p>Poor cover for juvenile coarse and salmonid species. Poor spawning habitat for rheophilic coarse and salmonid species and moderate spawning habitat for phytophilic coarse species.</p> <p>Deep water habitat type identified as dominant with silt substrate.</p> <p>Overall habitat quality assessment – poor, minimal habitat variation, heavily reinforced banks and channel, with little substrate, flow or macrophyte diversity.</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
Unnamed tributary watercourse of Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-126; D4) (ordinary watercourse)	030-RS1-186001 (15 May 2013) 030-RS1-186002 (15 May 2013)	RCS	Complete	<p>030-RS1-186001 – (SK 13943 12287 to SK 14163 11871)</p> <p>Watercourse in an area of wasteland emerging from a culvert in an industrial area. Pollution in the form of oil deposits observed at survey. The channel was straightened and over-deepened with deep silt and oil deposits. Heavily overgrown by scrub, dominated by blackthorn (<i>Prunus spinosa</i>). Abundant reeds and rushes were present in unshaded sections of the channel, including hard-rush (<i>Juncus inflexus</i>), soft-rush and branched bur-reed. Emergent herbs were also present in unshaded areas, dominated by fool's water-cress.</p> <p>Adjacent land use included broadleaf woodland, tilled land (bare), semi-improved grassland and an industrial yard.</p> <p>All of the survey reach is coincident with proposed watercourse realignment.</p> <p>030-RS1-186002 – (SK 14165 11874 to SK 14534 11540)</p> <p>Straightened, over-deepened watercourse flowing through woodland with associated drains and ponds. Abundant herbs and reeds were present where it was not heavily shaded, including marginal beds of hard-rush, soft-rush and both floating and submerged water star-wort was abundant.</p> <p>Adjacent land use included wasteland, tilled land (bare), broadleaf woodland and scrub.</p> <p>Upstream section of the survey reach is coincident with proposed watercourse realignment.</p>
	030-RS2-186001 (15 May 2013) 030-RS2-186002 (15 May 2013)	RHS	Complete	<p>030-RS2-186001 – (SK 13943 12287 to SK 14142 11906)</p> <p>HMS 3214; HMC: 5; HQA: 30</p> <p>Wetted width: 2m</p> <p>Water depth: 0.6m</p> <p>The presence of channel resectioning and three major culverts contribute to a HMS of 3214, and an HMC of 5 (severely modified).</p> <p>All of the survey reach is coincident with proposed watercourse realignment.</p> <p>030-RS2-186002 – (SK 141421 1906 to SK 14416 11573)</p> <p>HMS 3225; HMC: 5; HQA: 36</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
				<p>Wetted width: 3m</p> <p>Water depth: 0.4m</p> <p>The presence of channel resectioning and one major culvert contribute to a HMS of 3225, and an HMC of 5 (severely modified).</p> <p>Upstream section of the survey reach is coincident with proposed watercourse realignment.</p>
	030-FH1-184002 (15 May 2013)	FHS	Complete	<p><i>030-FH1-184002 – (SK 13943 12287 to SK 14534 11540)</i></p> <p>Poor cover for juvenile salmonid and coarse species and poor for all spawning phytophilic and rheophilic species.</p> <p>Heavily silted and overgrown channel with run habitat type dominant.</p> <p>Overall habitat quality assessment – poor.</p>
Trent and Mersey Canal (canal)	<p>030-RS1-188001 (16 May 2013)</p> <p>030-RS1-188002 (16 May 2013)</p> <p>030-RS1-188003 (16 May 2013)</p> <p>030-RS1-188004 (16 May 2013)</p> <p>030-RS1-188005 (16 May 2013)</p>	RCS	Complete	<p><i>030-RS1-188001 – (SK 11611 14746 to SK 11824 14275)</i></p> <p>A uniform watercourse with artificial banks. Slow flowing with high turbidity. The bank material was sheet-piling (wood and metal) with earth and grass growing over the top. Towpath present on the left bank with mown grass and hedges set back from the water's edge.</p> <p>Mature trees including ash and alder on the right bank overhanging the canal with exposed and submerged roots. A few small isolated patches of reeds and emergent herbs were present along both banks including great willowherb, reed sweet-grass, branched bur-reed, yellow iris and reed canary-grass. No macrophytes were present in the main channel, possibly due to the depth, turbidity and regular disturbance by boat traffic.</p> <p>Adjacent land use mixed, including woodland/scrub gardens and tilled land.</p> <p><i>030-RS1-188002 – (SK 11824 14275 to SK 12246 13935)</i></p> <p>A uniform watercourse with artificial banks. Slow flowing with high turbidity. The bank material was sheet-piling (wood and metal) with earth and grass growing over the top. Towpath present on the left bank.</p> <p>The trees of the woodland on the right bank overhung the channel with some exposed and submerged roots. There were almost no macrophytes in the channel due to the depth, turbidity and regular disturbance by boat traffic. Ferns were present on the left bank at the downstream end of the survey</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
				<p>reach.</p> <p>Adjacent land use mixed, including woodland, tilled land and a small watercourse.</p> <p><i>030-RS1-188003 – (SK 12246 13935 to SK 12743 13630)</i></p> <p>A uniform watercourse with artificial banks. Slow flowing with high turbidity. The bank material was sheet-piling (wood and metal) with earth and grass growing over the top. Towpath present on the left bank.</p> <p>The trees of the woodland on the right bank overhung the channel with some exposed and submerged roots. Macrophytes limited to reed beds between tree roots on the right bank and occasional stands on the left bank dominated by reed sweet-grass. The non-native monkeyflower (<i>Mimulus guttatus</i> agg.) was recorded in this survey reach.</p> <p>Adjacent land use mixed, including broadleaf woodland, tilled land and a small watercourse.</p> <p>Two of the three proposed crossing points are located within this survey reach. Canal habitats and biotypes and the wider corridor at crossing point are typical.</p> <p><i>030-RS1-188004 – (SK 12743 13630 to SK 13021 13277)</i></p> <p>A man-made water body with a uniform, resectioned channel and artificial banks. Slow flowing with high turbidity. The bank material was sheet-piling (wood and metal) with earth and grass growing over the top. Towpath present on the left bank.</p> <p>The trees of the woodland on the right bank overhung the channel with some exposed and submerged roots. Macrophytes included reed beds on both banks. These were dominated by yellow iris, branched bur-reed and reed sweet-grass. A lock is located at the downstream end of this survey reach.</p> <p>Adjacent land use mixed, including mixed woodland, coniferous woodland, tilled land and a small watercourse.</p> <p><i>030-RS1-188005 – (SK 13021 13277 to SK 13560 13687)</i></p> <p>A man-made water body with a uniform, resectioned channel and artificial banks. Slow flowing with high turbidity. The bank material was sheet-piling (wood and metal) with earth and grass growing over the top. Towpath present on the left bank.</p> <p>The trees of the woodland on the right bank overhung the channel with some exposed and submerged</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
				<p>roots. Reed beds on both banks dominated by yellow iris and reed sweet-grass. The non-native monkeyflower was recorded in this survey reach.</p> <p>Adjacent land use mixed, including mixed and wet woodland, tilled land and a small watercourse.</p> <p>The third of the three proposed crossing points is located within this survey reach. Canal habitats and biotypes and the wider corridor at crossing point are typical.</p>
	<p>030-RS2-188001 (15 May 2013)</p> <p>030-RS2-188002 (15 May 2013)</p> <p>030-RS2-188003 (15 May 2013)</p> <p>030-RS2-188004 (15 May 2013)</p> <p>030-RS2-188005 (15 May 2013)</p>	RHS	Complete	<p><i>030-RS2-188001 – (SK 11612 14744 to SK 11794 14307)</i></p> <p>HMS 2950; HMC: 5; HQA: 26</p> <p>Wetted width: 7m</p> <p>Water depth: 1.5m</p> <p>The presence of bank reinforcement (hard edged revetment) and channel resectioning contribute to a HMS of 2950, and an HMC of 5 (severely modified).</p> <p><i>030-RS2-188002 – (SK 11794 14307 to SK 12131 14003)</i></p> <p>HMS 2780; HMC: 5; HQA: 26</p> <p>Wetted width: 8m</p> <p>Water depth: 1.5m</p> <p>The presence of bank reinforcement (hard edged revetment) and channel resectioning contribute to a HMS of 2780, and an HMC of 5 (severely modified).</p> <p><i>030-RS2-188003 – (SK 12576 13791 to SK 12126 14003)</i></p> <p>HMS 2840; HMC: 5; HQA: 26</p> <p>Wetted width: 8m</p> <p>Water depth: 1.5m</p> <p>The presence of bank reinforcement (hard edged revetment) and channel resectioning contribute to a HMS of 2840, and an HMC of 5 (severely modified).</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
				<p><i>030-RS2-188004 – (SK 12576 13791 to SK 12874 13390)</i></p> <p>HMS 3080; HMC: 5; HQA: 30</p> <p>Wetted width: 8m</p> <p>Water depth: 1.5m</p> <p>The presence of bank reinforcement (hard edged revetment), channel resectioning and a bridge contribute to a HMS of 3080, and an HMC of 5 (severely modified).</p> <p>The third of the three proposed crossing points located within this survey reach.</p> <p><i>030-RS2-188005 – (SK 12874 13390 to SK 13286 13433)</i></p> <p>HMS 2694; HMC: 5; HQA: 32</p> <p>Wetted width: 8m</p> <p>Water depth: 1.5m</p> <p>The presence of bank reinforcement (hard edged revetment) and channel resectioning contribute to a HMS of 2694, and an HMC of 5 (severely modified).</p> <p>Two of the three proposed crossing points located within this survey reach.</p>
	030-FH1-188001 (15 May 2013)	FHS		<p><i>030-FH1-188001 – (SK 11611 14746 to SK 13560 13687)</i></p> <p>Poor cover for juvenile salmonid and coarse species and poor for spawning for all phytophilic and rheophilic species.</p> <p>Silt dominated with glide and run habitats dominant.</p> <p>Overall habitat quality assessment – poor.</p> <p>All proposed crossing points within this survey reach.</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
Curborough Brook (main river)	030-RS1-188006 (17 May 2013)	RCS	Complete	<p>030-RS1-188006 – (SK 13022 13290 to SK 13040 13709)</p> <p>A heavily resectioned stream, severely over-deepened and straightened with evidence of recent desilting. Semi-natural section occurred in a small woodland area at the upstream end of the survey reach, with overhanging trees, a pool and a riffles present. Macrophytes were limited to emergent herbs and reeds on the left bank unaffected by desilting. The only macrophyte species present were water-cress and a small bed of reed canary-grass.</p>
	030-RS2-188006 (17 May 2013)	RHS	Complete	<p>030-RS2-188006 – (SK 13022 13290 to SK 13043 13731)</p> <p>HMS 2925; HMC: 5; HQA: 50</p> <p>Wetted width: 3m</p> <p>Water depth: 0.2m</p> <p>The presence of bank reinforcement, channel resectioning and a major weir contribute to a HMS of 2925, and an HMC of 5 (severely modified).</p>
	030-FH1-188002 (17 May 2013)	FHS	Complete	<p>030-FH1-188002 – (SK 13023 13289 to SK 13560 13687)</p> <p>Poor cover for juvenile salmonid and coarse species. Poor habitat for spawning phytophilic coarse species. Moderate spawning habitat for rheophilic coarse fish and brown trout (<i>Salmo trutta</i>).</p> <p>A variety of substrates identified with gravel dominant. In-channel habitat diversity good, although obviously resectioned.</p> <p>Overall habitat quality assessment –moderate.</p>

Watercourse type – name	Survey references (survey date)	Type of survey	Survey status	Survey results
Bourne Brook (ordinary watercourse)	030-RS1-190001 (17 May 2013)	RCS	Complete	<p>030-RS1-190001 – (SK 10833 14098 to SK 11018 14517)</p> <p>A relatively natural small watercourse flowing through agricultural land (semi-improved grassland and tilled land) and woodland. Riffles and pools present with overhanging and fallen trees with submerged and exposed bank side roots. This section was heavily shaded by alder with few macrophytes present. Small patches of macrophytes were present at the bridge/weir in the upstream section of this reach where there was no shading from trees. Water star-wort, brooklime, reed canary-grass and unbranched bur-reed were all recorded.</p> <p>The river corridor was complex with semi-continuous trees and shrubs occurring along both banks and broadleaf woodland at the upstream end of the reach.</p>
	030-RS2-190001 (17 May 2013)	RHS	Complete	<p>030-RS2-190001 – (SK 10833 14098 to SK 10916 14448)</p> <p>HMS 1020; HMC: 4; HQA: 55</p> <p>Wetted width: 2m</p> <p>Water depth: 0.4m</p> <p>Some channel resectioning and bank reinforcement. The presence of a weir and minor bridge contribute mainly to a HMS of 1020, and an HMC of 4 (significantly modified).</p>
	030-FH1-190001 (17 May 2013)	FHS	Complete	<p>030-FH1-190001 – (SK 10833 14098 to SK 11020 14517)</p> <p>Poor cover for juvenile salmonid and coarse species. Poor habitat for spawning phytophilic coarse species. Moderate spawning habitat for rheophilic coarse fish and salmonids.</p> <p>A variety of substrates identified with gravel dominant. Habitat diversity good, with riffles, pools and run habitats recorded.</p> <p>Overall habitat quality assessment –moderate.</p>

Notes: RCS = River Corridor Survey, RHS = River Habitat Survey, FHS = Fish Habitat Survey, HMS = Habitat Modification Score, HMC=Habitat Modification Class, HQA = Habitat Quality Assessment

- 6.4.139 None of the watercourses within 100m of the land required for the construction of the Proposed Scheme in this area have statutory designations. The Trent and Mersey Canal is, however, designated as SBI.
- 6.4.140 Rivers and streams are identified as habitat of principal importance. The Staffordshire LBAP lists rivers and streams as habitats of principal importance and their aims regarding these include: ensuring the quality of watercourses and their corridors do not deteriorate; and enhancing those watercourses supporting UK species of principal importance or Red Data Book species.
- 6.4.141 Habitat surveys conducted of the Wyrley and Essington Canal conducted to the east of the crossing have identified the heavily modified nature of this watercourse (HMC 5 indicates a severely modified system) and that it supports only commonly occurring aquatic macrophytes which occur sporadically all the canal. FHS has identified poor habitat availability for fish species as a result of the limited biotypes supported and the lack of flow and substrate heterogeneity. The Proposed Scheme crossing point is coincident with an in-filled location on the canal. Although a limited range of habitats and biotypes are supported the watercourse is still considered to provide a valuable wildlife corridor. Review of OS mapping and aerial photography has identified that the section of canal to the west of the crossing that could not be surveyed due to access constraints is of similar character to the survey reach i.e. contains only limited range of habitats and biotypes.
- 6.4.142 The Coventry Canal is a homogenous system with limited aquatic/marginal vegetation and poor quality habitats for fish. As a result of the artificial nature of the watercourse the physical habitat is described as being severely modified (HMC 5). Conversely, the bank top and adjacent habitat structure is relatively complex with semi-continuous scrub and mature trees present. The complex nature of the adjacent habitats means that a valuable wildlife corridor is supported alongside the canal.
- 6.4.143 The unnamed tributary watercourse of Mare Brook (current watercourse alignment crossing Volume 5: Map Books – Ecology, Map EC-10-126; D4) has been identified as being severely modified (HMC: 5) due the extent of resectioning and the presence of culverts along the survey reach. The watercourse flows through wooded and unshaded sections where it supports emergent herbs and rushes. Its riparian zone is complex including the presence of open water bodies and associated vegetation. Oil pollution was observed at survey and fish habitat quality assessed as poor on account of silt levels. The watercourse is, however, is relatively complex in nature and supports a range of habitats
- 6.4.144 Habitat surveys conducted on the Trent and Mersey Canal have identified the presence of a uniform channel with artificial banks throughout with high levels turbidity. As a result of the artificial nature of the watercourse the physical habitat is described as being significantly modified (HMC: 5). Marginal macrophyte stands presented occasionally along the canal edge containing common native species, although the invasive monkeyflower was also recorded at survey. The canal corridor was characterised by the presence of trees/woodland along both banks. The survey reaches are within part of the King's Bromley Wharf to Fradley Junction, Coventry Canal SBI which is designated, due to it supporting in places, diverse bands of both marginal and emergent vegetation.

- 6.4.145 Habitat surveys conducted on the Curborough Brook have identified the watercourse as severely modified (HMC: 5) due to over deepening, straightening and recent desilting. Macrophytes were limited to emergent herbs and reeds on the left bank unaffected by desilting. Although heavily resectioned some good in-channel habitats dominated by gravel were observed providing moderate habitat for spawning rheophilic species. Adjacent woodland in the southern section of the survey reach, semi-continuous tree/shrub cover and vegetated banks provide a valuable wildlife corridor.
- 6.4.146 The Bourne Brook is identified through RHS as a significantly modified watercourse (HMC: 4). The presence of structures including a weir contribute significantly to this score. The planform of the watercourse is good, with sinuous sections supporting a diverse range of in-channel habitats including riffle/pool sequences. Further structural complexity is provided in the form of overhanging and fallen trees and the presence of common macrophyte in unshaded sections. The fish habitat is assessment identified the watercourse as being of moderate quality for rheophilic spawning coarse and salmonid species. The complex nature of the river corridor provides value as a wildlife corridor within a predominantly agricultural setting.
- 6.4.147 No habitat surveys of the unnamed tributary watercourse of the Fisherwick Brook (Volume 5: Map Books – Ecology, Map EC-10-124; D6), unnamed tributary watercourse of Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-126; D4), or the Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-126; H3) have been undertaken due to access constraints. In the absence of specific habitat data for these watercourses, review of OS mapping and aerial photography was undertaken to provide an initial assessment of these watercourses.
- 6.4.148 This review has identified the unnamed tributary of the Fisherwick Brook (Volume 5: Map Books – Ecology, Map EC-10-124; D6) as a highly modified, straightened watercourse exhibiting limited habitat variability. In the vicinity of the Proposed Scheme crossing point it is devoid of tree cover and as a result lacks habitat complexity.
- 6.4.149 Although obviously modified, the unnamed tributary watercourse of the Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-126; D4) does exhibit good planform in the vicinity of the Proposed Scheme crossing. It is straightened throughout much of its length but its habitat structure is improved by the presence of a narrow strip of mature and semi-mature trees along its banks. Sections of good planform are considered likely to support a range of in-channel features and the associated riparian structure is relatively complex.
- 6.4.150 The Mare Brook (Volume 5: Map Books – Ecology, Map EC-10-126; H3) has a sinuous planform in the vicinity of the Proposed Scheme crossing point and is, therefore, likely to support variety of in-channel habitat features. Its habitat structure is improved by the presence of occasional mature and semi-mature trees/scrub which line the watercourse. Due to this combination the Mare Brook is likely to support a range of biotypes and provide a valuable wildlife corridor in an otherwise agricultural landscape.

7 River corridor survey

- 7.1.1 All RCS methodology, limitations and baseline data is provided in Section 6 of this appendix.

8 Ditch survey

8.1.1 No ditch surveys were carried out in CFA16 to CFA22 inclusive.

9 Hedgerow survey

9.1 Introduction

- 9.1.1 This section of the appendix presents details of hedgerow survey, and associated desk study information for the section of the Proposed Scheme that will pass through CFA16 to CFA22 inclusive.

9.2 Methodology

- 9.2.1 Details of the standard methodology utilised for hedgerow surveys are provided in the Ecology technical note: Ecological field survey methods and standards (Volume5: Appendix CT-001-000/2).

- 9.2.2 Desk study information relevant to ecologically important hedgerows was obtained from the following sources:

- Staffordshire Ecological Record;
- Warwickshire County Council; and
- Warwickshire Biological Records Centre.

- 9.2.3 A desk study was undertaken to assess whether hedgerows qualify as 'important hedgerows' under archaeology and history criteria of The Hedgerow Regulations (1997) for the heritage assessment of the Proposed Scheme. Information relevant to historically important hedgerows was obtained using historic Ordnance Survey (OS) maps, historic tithe maps and other historic datasets (such as Historic Environment Records data) to determine a minimum age of hedgerows. Aerial photographs and satellite imagery were also used to identify historic hedgerows using photographs obtained from the National Monuments Record office of English Heritage in Swindon. Historic Landscape Characterisation (HLC) data, where available, was used to identify pre-enclosure field patterns and assess the present hedgerows' abilities to reflect those patterns. These patterns can confirm an individual hedgerow's contribution to the historic landscape (further detailed information on historic hedgerows can be found within Volume 5: Appendix CH-001-016 to CH-001-022).

9.3 Deviations, constraints and limitations

- 9.3.1 In many locations it has not been possible to conduct hedgerow surveys within the study area. This is due to either a lack of access to land to undertake field surveys, or to access permission to undertake survey being granted too late to undertake field surveys within the approved survey period.

9.4 Baseline

- 9.4.1 For hedgerows that meet the wildlife and landscape criteria to be considered an 'important hedgerow'⁵⁸ under the Hedgerow Regulations (1997)⁵⁹ the qualifying criteria are identified in Table 134.

⁵⁸ Hedgerow which meets the necessary criteria identified defined in The Hedgerow Regulations (1997). Note the current assessment only takes into consideration the wildlife and landscape criteria, as historical value does not form part of the scope of the ecological assessment.

⁵⁹ HMSO (1997), *The Hedgerow Regulations*. SI 1197 No. 1160.

Table 134: Summary of hedgerows qualifying as 'important hedgerows' under wildlife and landscape criteria

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within the land required for construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
030-HS1-124002	SP 41705 59928	20 June 2012						✓		CFA16	Yes
030-HS1-127001	SP 39454 61955	22 May 2012						✓		CFA16	Yes
030-HS1-123005	SP 42697 59278	04 July 2012			✓					CFA16	Yes
030-HS1-124006	SP 41780 60311	20 June 2012			✓				✓	CFA16	Yes
030-HS1-124005	SP 41803 60241	20 June 2012							✓	CFA16	Yes
030-HS1-123006	SP 42182 59581	20 June 2012							✓	CFA16	Yes
030-HS1-124004	SP 41688 60186	20 June 2012			✓					CFA16	Yes
030-HS1-128005	SP 38581 63097	15 August 2012				✓				CFA16	Yes
030-HS1-128004	SP 38471 63209	15 August 2012			✓	✓				CFA16	Yes
030-HS1-129001	SP 38604 63674	15 August 2012				✓				CFA16	Yes
030-HS1-128003	SP 38866 63665	15 August 2012						✓		CFA16	No
030-HS1-128002	SP 39132 63516	15 August 2012	✓							CFA16	No
030-HS1-123003	SP 42252 58916	30 May 2013			✓					CFA16	No
030-HS1-123002	SP 42284 58982	30 May 2013						✓		CFA16	No
030-HS1-123001	SP 42342 58887	30 May 2013			✓					CFA16	No
030-HS1-122001	SP 42489 58801	30 May 2013			✓	✓				CFA16	Yes
030-HS1-124001	SP 4157 5981	19 June 2013			✓	✓				CFA16	Yes
030-HS1-123004	SP 42161 58851	12 April 2013				✓		✓	✓	CFA16	No
030-HS1-119001	SP 43000 55610	08 March 2012						✓		CFA16	Yes
030-HS1-119002	SP 43004 55597	08 March 2013	✓					✓	✓	CFA16	Yes

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within the land required for construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
030-HS1-127004	SP 3950 6254	24 June 2013			✓					CFA16	No
030-HS1-127003	SP 3950 6251	24 June 2013			✓	✓				CFA16	No
030-HS1-127002	SP 3955 6250	24 June 2013								CFA16	No
030-HS1-127004	SP 3950 6254	24 June 2013			✓					CFA16	No
030-HS1-124003	SP 42011 60005	17 January 2013			✓					CFA16	Yes
030-HS1-128001	SP 3935 6326	31 October 2012			✓					CFA16	No
030-HS1-124007	SP 40920 59750	17 January 2013			✓					CFA16	No
030-HS1-133002	SP 3548 6729	02 July 2013			✓					CFA17	No
030-HS1-133001	SP 3572 6676	02 July 2013			✓	✓				CFA17	No
030-HS1-133003	SP 3581 6767	02 July 2013			✓	✓				CFA17	Yes
030-HS1-136006	SP 3421 6908	03 July 2013							✓	CFA17	No
030-HS1-136003	SP 3446 6963	03 July 2013						✓		CFA17	Yes
030-HS1-136002	SP 3467 6942	03 July 2013			✓					CFA17	No
030-HS1-135009	SP 3498 6908	03 July 2013						✓		CFA17	Yes
030-HS1-135006	SP 3450 6869	04 July 2013						✓		CFA17	Yes
030-HS1-136005	SP 3465 6995	04 July 2013			✓					CFA17	Yes
030-HS1-136004	SP 3454 6993	04 July 2013			✓			✓		CFA17	Yes
030-HS1-136008	SP 3433 6934	04 July 2013						✓		CFA17	Yes
030-HS1-136001	SP 3471 6942	04 July 2013			✓					CFA17	No
030-HS1-135010	SP 3477 6922	04 July 2013			✓					CFA17	Yes
030-HS1-135008	SP 3499 6896	04 July 2013						✓		CFA17	Yes

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within the land required for construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
030-HS1-135007	SP 3462 6879	04 July 2013						✓		CFA17	No
030-HS1-134013	SP 3472 6807	01 July 2013			✓					CFA17	No
030-HS1-134015	SP 3491 6795	01 July 2013			✓	✓				CFA17	No
030-HS1-134005	SP 3503 6762	01 July 2013						✓		CFA17	Yes
030-HS1-134002	SP 3548 6765	01 July 2013			✓					CFA17	Yes
030-HS1-134007	SP 3569 6791	01 July 2013			✓	✓				CFA17	No
030-HS1-134008	SP 3554 6807	01 July 2013						✓		CFA17	Yes
030-HS1-134011	SP 3554 6813	01 July 2013			✓					CFA17	Yes
030-HS1-134006	SP 3489 6771	01 July 2013			✓					CFA17	Yes
030-HS1-134009	SP 3534 6825	01 July 2013			✓	✓				CFA17	Yes
030-HS1-134001	SP 3522 6745	02 July 2013				✓				CFA17	No
030-HS1-134004	SP 3541 6788	02 July 2013				✓				CFA17	No
030-HS1-134010	SP 3536 6816	02 July 2013	✓		✓					CFA17	Yes
030-HS1-134012	SP 3541 6820	02 July 2013				✓				CFA17	Yes
030-HS1-134003	SP 3518 6773	02 July 2013			✓					CFA17	No
030-HS1-134014	SP 3502 6814	03 July 2013				✓				CFA17	No
030-HS1-135001	SP 3496 6852	03 July 2013						✓		CFA17	Yes
030-HS1-135005	SP 3445 6864	03 July 2013				✓				CFA17	Yes
030-HS1-135003	SP 3476 6879	03 July 2013			✓					CFA17	Yes
030-HS1-135002	SP 3491 6864	03 July 2013				✓				CFA17	Yes
030-HS1-135004	SP 3469 6861	03 July 2013			✓	✓				CFA17	No

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within the land required for construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
030-HS1-136007	SP 34146918	03 July 2013				✓				CFA17	No
030-HS1-144010	SP 28805 76765	13 July 2012						✓		CFA18	Yes-
030-HS1-143010	SP 28966 78488	13 July 2012						✓		CFA18	No
030-HS1-146002	SP 26750 76422	14 July 2012				✓			✓	CFA18	No
030-HS1-146003	SP 26634 76299	14 July 2012						✓		CFA18	No
030-HS1-141003	SP 31034 73238	25 June 2012						✓		CFA18	Yes
030-HS1-141004	SP 31106 73419	25 June 2012			✓					CFA18	Yes
030-HS1-144006	SP 2845 7509	26 June 2013			✓					CFA18	No
030-HS1-145004	SP 27563 75769	18 December 2012							✓	CFA18	No
030-HS1-145003	SP 27798 75682	18 December 2012				✓				CFA18	No
030-HS1-145002	SP 27924 75929	18 December 2012						✓	✓	CFA18	No
030-HS1-145006	SP 27767 75989	18 December 2012				✓				CFA18	No
030-HS1-145007	SP 27664 76116	18 December 2012						✓		CFA18	No
030-HS1-146001	SP 27579 76329	18 December 2012				✓				CFA18	No
030-HS1-145001	SP 28016 75810	18 December 2012				✓		✓	✓	CFA18	No
030-HS1-147006	SP25879 76466	20 June 2012			✓						
030-HS1-144009	SP 28397 75459	18 December 2012			✓	✓		✓	✓	CFA18	No
030-HS1-144011	SP 28520 75177	18 December 2012			✓			✓		CFA18	No
030-HS1-145005	SP 27638 75982	18 December 2012						✓		CFA18	No
030-HS1-144002	SP 2866 7429	18 December 2012						✓		CFA18	No
030-HS1-144004	SP 2808 7474	18 December 2012						✓		CFA18	Yes

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within the land required for construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
030-HS1-144001	SP 2839 7399	18 December 2012						✓		CFA18	No
030-HS1-143004	SP 2882 7433	18 December 2012						✓		CFA18	Yes
030-HS1-143002	SP 2877 7400	18 December 2012			✓	✓		✓	✓	CFA18	No
030-HS1-143003	SP 2871 7446	18 December 2012			✓	✓		✓		CFA18	Yes
030-HS1-143005	SP 2867 7445	18 December 2012						✓		CFA18	Yes
030-HS1-144005	SP 2870 7486	18 December 2012						✓		CFA18	Yes
030-HS1-145008	SP 2712 7542	26 June 2013						✓		CFA18	No
030-HS1-142002	SP 29674 73868	04 May 2012			✓					CFA18	No
030-HS1-142001	SP 29936 73969	04 May 2012			✓					CFA18	Yes
030-HS1-142003	SP29579 73821	04 May 2012						✓		CFA18	No
030-HS1-143001	SP 29489 73711	04 May 2012						✓		CFA18	No
030-HS1-143009	SP 29259 73898	04 May 2012						✓		CFA18	No
030-HS1-143007	SP 29206 73896	04 May 2012						✓		CFA18	No
030-HS1-143006	SP 29139 73969	04 May 2012						✓		CFA18	No
030-HS1-140001	SP 3131 7239	27 June 2013						✓		CFA18	No
030-HS1-140002	SP 3149 7250	27 June 2013						✓		CFA18	Yes
030-HS1-140003	SP 3147 7277	27 June 2013						✓		CFA18	Yes
030-HS1-140004	SP 3135 7285	27 June 2013			✓	✓				CFA18	No
030-HS1-141001	SP 3113 7296	27 June 2013			✓	✓				CFA18	Yes
030-HS1-141002	SP 3089 7305	27 June 2013			✓	✓				CFA18	Yes
030-HS1-144007	SP 2026 7508	12 February 2013			✓	✓			✓	CFA18	No

[illegible]

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within the land required for construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
030-HS1-167001	SP 1948 9406	27 June 2013				✓				CFA20	Yes
030-HS1-167005	SP 1956 9404	27 June 2013				✓				CFA20	No
030-HS1-167003	SP 1957 9405	27 June 2013						✓		CFA20	No
030-HS1-167004	SP 1958 9407	27 June 2013				✓				CFA20	No
030-HS1-167002	SP19589405	27 June 2013						✓		CFA20	No
030-HS1-172002	SP 1723 9875	15 August 2012								CFA20	No
030-HS1-172001	SP 1669 9837	15 August 2012			✓					CFA20	No
030-HS1-167007	SP 19474 95158	10 May 2012						✓		CFA20	Yes
030-HS1-167006	SP 19354 94630	02 May 2012						✓		CFA20	Yes
030-HS1-174001	SK 1739 0109	10 October 2012						✓		CFA21	No
030-HS1-173002	SK 1781 0500	10 October 2012				✓			✓	CFA21	No
030-HS1-173001	SK 1787 0071	10 October 2012			✓	✓			✓	CFA21	No
030-HS1-174004	SK 17360 01425	10 October 2012						✓		CFA21	No
030-HS1-180001	SK 14896 06655	28 February 2013			✓					CFA21	Yes
030-HS1-174002	SK 1682 0056	19 February 2013						✓		CFA21	Yes
030-HS1-174005	SK 17463 01625	10 October 2012						✓		CFA21	No
030-HS1-175001	SK 1613 0142	25 September 2012						✓		CFA21	Yes
030-HS1-174003	SK 16957 00929	10 October 2012									
030-HS1-188001	SK 12823 13483	01 May 2012						✓		CFA22	Yes
030-HS1-188002	SK 12851 13430	01 May 2012						✓		CFA22	Yes
030-HS1-185001	SK 14538 11270	21 March 2013			✓					CFA22	No

Ecology survey code	Centroid OS grid reference	Survey date	Qualifying wildlife and landscape criteria							CFA	Within the land required for construction of the Proposed Scheme (Yes/No)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)		
030-HS1-187001	SK13397 12683	10 October 2012			✓					CFA22	Yes
030-HS1-187002	SK13396 12716	10 October 2010			✓					CFA22	Yes

* = Hedgerow also meets the archaeology and history criteria defined in The Hedgerow Regulations (1997).

KEY TO WILDLIFE AND LANDSCAPE CRITERIA:

(1) Hedgerow contains species listed on either:

- Part 1 of Schedule 1 of the Wildlife and Countryside Act (1981 as amended)⁶⁰;
- Schedule 5 of the Wildlife and Countryside Act (1981 as amended);
- Schedule 8 of the Wildlife and Countryside Act (1981 as amended).

- or categorised as either:

- a declining breeder (category 3) in 'Red Data Birds in Britain'⁶¹;
- 'endangered', 'extinct', 'rare' or 'vulnerable' in Britain in British Red Data Books for vascular plants⁶²; insects⁶³; and invertebrates other than insects⁶⁴.

(2) Hedgerow referred to in a biological desk study record as containing one of the species above within the last five (animals and birds) or ten years (for plants) (N.B. age of records should be considered in relation to – November 2013 the proposed point of submission).

(3) Hedgerow contains at least seven woody species.

(4) Hedgerow contains at least six woody species and at least 3 of the following features identified in

Schedule 1 Part II paragraph 7 sub-paragraph 4 of the Hedgerow Regulations, namely;

- a bank or wall which supports the hedgerow along at least one half of its length;
- gaps which in aggregate do not exceed 10% of the length of the hedgerow;
- where the length of the hedgerow does not exceed 50m, at least one standard tree;
- where the length of the hedgerow exceeds 50m but does not exceed 100m, at least 2 standard trees;

- where the length of the hedgerow exceeds 100m, such number of standard trees (within any part of its length) as would when averaged over its total length amount to at least one for each 50m;

- at least three woodland species within 1m, in any direction, of the outermost edges of the hedgerow;

- a ditch along at least one half of the length of the hedgerow;

- connections scoring four points or more – connection with another hedgerow scores one point and a connection with a pond or a woodland in which the majority of trees are broad-leaved trees scores two points; and a hedgerow is connected with something not only if it meets it but also if it has a point within 10m of it and would meet it if the line of the hedgerow continued;

- a parallel hedge within 15m of the hedgerow.

(5) Hedgerow contains at least six woody species, including one of the following

black-poplar tree (*Populus nigra* ssp *betulifolia*);

large-leaved lime (*Tilia platyphyllos*);

small-leaved lime (*Tilia cordata*);

wild service-tree (*Sorbus torminalis*)

(6) Hedgerow is adjacent to a bridleway or footpath, a road used as a public path, a byway open to all traffic and includes at least four woody species and a least two of the features specified under (4) above;

(7) Hedgerow containing at least five woody species and at least four of the features specified under (4) above.

⁶⁰ Her Majesty's Stationary Office, London. *Wildlife and Countryside Act 1981* (England and Wales)(as amended).Ch. 69.

⁶¹ Batten LA, Bibby CJ, Clement P, Elliott GD and Porter RF (Eds.) (1990), *Red data birds in Britain*. Nature Conservancy Council and the Royal Society for the Protection of Birds (ISBN 0 85661 056 9).

⁶² Perring FH and Farrell L, 2nd Edition (1983), *Vascular Plants*. Royal Society for Nature Conservation (ISBN 0 902484 04 4).

⁶³ Shirt D B (Ed) (1987), *Insects*. Nature Conservancy Council (ISBN 0 86139 380 5).

⁶⁴ Bratton JH (Ed.) (1991), *Invertebrates other than insects*. Joint Nature Conservation Committee (ISBN 1 873701 00 4).

CFA16 Ladbroke and Southam

- 9.4.2 Within this area, 67 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations. Of those that were surveyed 26 qualified as ecologically important hedgerows and 17 of these are within the land required for the construction of the Proposed Scheme (see Table 134 above).
- 9.4.3 The majority of the important hedgerows qualified under criteria three or four (see above for descriptions of criteria) which is that the hedgerow contains at least seven woody species, or contains at least six woody species and at least three features (such as a ditch, bank or contains a specific number of mature trees).
- 9.4.4 The most common woody species found within these hedgerows were field maple (*Acer campestre*), hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), English oak (*Quercus pedunculata*), holly (*Ilex aquifolium*), blackthorn (*Prunus spinosa*), rose (*Rosa* sp.) and elder (*Sambucus nigra*).
- 9.4.5 Of the 26 ecologically important hedgerows surveyed in this area, four hedgerows also qualify under the historical criteria defined in The Hedgerow Regulations and are classed as ancient⁶⁵. All four of these hedgerows are within the land required for the construction of the Proposed Scheme.
- 9.4.6 The four ecologically and historical important hedgerows within the land required for the construction of the Proposed Scheme are:
- 030-HS1-128005 (Map Book EC-10-087, F8) – north and adjacent to Long Itchington and Ufton Wood SSSI;
 - 030-HS1-128004 (Map Book EC-10-087, E7) – north of Long Itchington and Ufton Wood SSSI near Wood Farm;
 - 030-HS1-129001 (Map Book EC-10-087, D4) – north east of Long Itchington and Ufton Wood SSSI; and
 - 030-HS1-124003 (Map Book EC-10-084, F6) – south of Harp Farm, near Ladbroke.
- 9.4.7 There are no hedgerows designated as Local Wildlife Sites (LWS) within 250m of the Proposed Scheme.

CFA17 Offchurch and Cubbington

- 9.4.8 Within this area, 74 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations. Of those that were surveyed, 35 qualified as an ecologically important hedgerow and of these 26 are within the land required for the construction of the Proposed Scheme (Table 134).
- 9.4.9 The majority of the important hedgerows qualified under criteria three which is that the hedgerow contains at least seven woody species.

⁶⁵ The hedgerow marks the boundary of at least one historic parish or township and for this purpose historic means existing pre-1850.

- 9.4.10 Of the 35 ecologically important hedgerows surveyed in this area, five hedgerows also qualify under the historical value criteria defined in the Hedgerow Regulations and are therefore classed as ancient⁶⁵. Four of these hedgerows are within the land required for the construction of the Proposed Scheme.
- 9.4.11 The four ecologically and historical important hedgerows within the land required for the construction of the Proposed Scheme are:
- 030-HS1-133003 (Map Book EC-10-090, A6) – east of Lower Grange Farm;
 - 030-HS1-134011 (Map Book EC-10-091, F4) – south of South Cubbington Wood (hedgerow containing veteran pear tree);
 - 030-HS1-134009 (Map Book EC-10-091, E4) –south of South Cubbington Wood; and
 - 030-HS1-134012 (Map Book EC-091, E2) – south west of South Cubbington Wood.
- 9.4.12 There are no hedgerows designated as LWS within 250m of the Proposed Scheme.

CFA18 Stoneleigh, Burton Green and Kenilworth

- 9.4.13 Within this area, 202 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations. Of those that were surveyed, 56 qualified as an ecologically important hedgerow and of these 32 are within the land required for the construction of the Proposed Scheme (see Table 134).
- 9.4.14 The majority of the important hedgerows qualified under criteria six which is a hedgerow adjacent to a bridleway or footpath, (a road used as a public path, a byway open to all traffic) and includes at least four woody species and a least two of the features such as a ditch, bank or mature trees.
- 9.4.15 Of the ecologically important hedgerows surveyed in this area, there are no hedgerows that also qualify under the historical value criteria defined in The Hedgerow Regulations.
- 9.4.16 There is one hedgerow designated as LWS within 250m of the Proposed Scheme called Beanit Farm Hedge LWS. A small section of it is within the land required for construction of the Proposed Scheme. It is a species rich hedgerow and has had a phase 1 habitat survey but not a detailed NVC survey undertaken.

CFA19 Coleshill Junction

- 9.4.17 Within this area, 146 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations. Of those that were surveyed, two qualified as an ecologically important hedgerow but only one is within the land required for the construction of the Proposed Scheme (see Table 134). This is 030-HS1-163001 (Map Book EC-10-110, A9), just south of Gypsy Lane, south east of Water Orton and adjacent to the M42 motorway.

9.4.18 The two ecologically important hedgerows identified in this area, do not also qualify under the historical value criteria defined in The Hedgerow Regulations.

9.4.19 There are no hedgerows designated as LWS within 250m of the Proposed Scheme.

CFA20 Curdworth to Middleton

9.4.20 Within this area, 68 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations. Of those that were surveyed, 14 qualified as an ecologically important hedgerow but only six of these are within the land required for the construction of the Proposed Scheme (see Table 134).

9.4.21 The six ecologically important hedgerows within the land required for the construction of the Proposed Scheme are:

- 030-HS1-171001 (Map Book EC-10-115, F7) – south of Walker's Spinney, near Middleton;
- 030-HS1-170001 (Map Book EC-10-115, G6) – south of Langley Brook, near Middleton;
- 030-HS1-171003 (Map Book EC-10-115, F8) – adjacent to Crowberry Lane, near Middleton;
- 030-HS1-171002 (Map Book EC-10-115, F8) – adjacent to Crowberry Lane, near Middleton;
- 030-HS1-167006 (Map Book EC-10-119, A5) – near the M42 motorway, north of Mullensgrove Farm; and
- 030-HS1-167001 (map Book EC-10-119, D4) – along A4097 Kingsbury Road, east of Mullensgrove Farm.

9.4.22 The majority of the important hedgerows qualified under criteria six which is a hedgerow adjacent to a bridleway or footpath, (a road used as a public path, a byway open to all traffic) and includes at least four woody species and a least two of the features such as a ditch, bank or mature trees.

9.4.23 Of the ecologically important hedgerows surveyed in this area, there are no surveyed hedgerows that also qualify under the historical value criteria defined in The Hedgerow Regulations.

9.4.24 There are no hedgerows designated as LWS within 250m of the Proposed Scheme.

CFA21 Drayton Bassett, Hints and Weeford

9.4.25 Within this area, 130 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an 'important hedgerow' under the Hedgerow Regulations. Of those that were surveyed, nine qualified as an ecologically important hedgerow but only four of these are within the land required for the construction of the Proposed Scheme (see Table 134).

9.4.26 The four ecologically important hedgerows within the land required for the construction of the Proposed Scheme are:

- 030-HS1-174003 (Map Book EC-10-117, C6) – east of Hill Farm, north of Drayton Bassett;
- 030-HS1-174002 (Map Book EC-10-117, D7) – north of Oak Farm, near Drayton Bassett;
- 030-HS1-175001 (Map Book EC-10-118, F7) – Waggoner’s Lane (hedge 1), near White House Farm. This hedge is a Site of Biological Interest (SBI). It is an important hedgerow based on its age and nature conservation features. Structurally the hedge is valued for its large width, height and shape; it also has a small ditch and a grass verge of over 2m on both sides. It is composed of common hawthorn and blackthorn with scattered pedunculate oak standards. Other woody species recorded include wild apple, hazel, elder and field maple. The hedge has eleven standard trees along its length. This hedge also comprises black bryony and white bryony and dog’s mercury, meadow vetchling and common knapweed are found in the grass verge. This hedgerow was also surveyed as part of the National Vegetation Classification⁶⁶ (NVC) survey (see Section 5); and
- 030-HS1-180001 (Map EC-10-123b, I6) – west of Whittington Barracks.

9.4.27 The majority of the important hedgerows qualified under criteria six which is a hedgerow adjacent to a bridleway or footpath, (a road used as a public path, a byway open to all traffic) and includes at least four woody species and a least two of the features such as a ditch, bank or mature trees.

9.4.28 Of the nine ecologically important hedgerows surveyed in this area, one hedgerow also qualifies under the historical value criteria defined in The Hedgerow Regulations (1997) and is classed as ancient; Waggoner’s Lane (hedge 1) SBI. This hedgerow is within the land required for the construction of the Proposed Scheme.

CFA22 Whittington to Handsacre

9.4.29 Within this area, 122 hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an ‘important hedgerow’ under the Hedgerow Regulations. Of those that were surveyed, five qualified as an ecologically important hedgerow, of which four are within the land required for the construction of the Proposed Scheme (see Table 134).

9.4.30 The four ecologically important hedgerows within the land required for the construction of the Proposed Scheme are:

- 030-HS1-030-HS1-188001 (Map Book EC-10-128, I6) east of Woodend Cottage, near Fradley Junction;
- 030-HS1-030-HS1-188002 (Map Book EC-10-128, J7) – east of Woodend Cottage;
- 030-HS1-187001 (Map Book EC-10 127, G9) – Curborough House Hedge SBI, west of Big Lyntus woodland; and

⁶⁶ NVC is a detailed survey and classification system that is used to compare plant communities with a range of defined community types.

- 030-HS1-187002(Map Book EC-10 127, G9) – Curborough House Hedge SBI, west of Big Lyntus woodland.

9.4.31 The majority of the important hedgerows qualified under criteria six which is a hedgerow adjacent to a bridleway or footpath, (a road used as a public path, a byway open to all traffic) and includes at least four woody species and a least two features such as a ditch, bank or mature trees.

9.4.32 There are three designated hedgerows within 250m of the Proposed Scheme:

- Curborough House (hedge 1) and Curborough House (hedge 4), Site of Biological Interest (SBI), are within the land required for construction of the Proposed Scheme. These two hedgerows that make up the designated site have been NVC surveyed. This species-rich hedgerow has an associated dry ditch, mature standard trees and species-rich ground flora. The most dominant woody species in the hedgerow is hawthorn with bramble, elder, field maple and hazel frequent. Mature pedunculate oak standard trees (up to 20m high) are frequent approximately every 50m. There is a verge of herbaceous vegetation in front of the hedgerow with a high diversity of herbaceous species present some of which are woodland ground flora species. The dominant species in the verge are false oat-grass and cow parsley, with creeping thistle, common couch, cleavers, bracken, wood sage, common nettle, hedge woundwort and white bryony (*Bryonia dioica*) also present; and
- Woodend Lane (hedge 1) Biodiversity Alert Site (BAS), which at its most westerly end is approx 160m south-west of the Proposed Scheme. Structurally the hedge is valued for its species rich canopy as it contains 14 hedge canopy species. The hedge had fourteen standard trees along its length and four young trees. The hedge also had a small ditch. This hedge has species such as gorse, hazel, crab apple and both black and white bryony. This hedgerow was not surveyed due to lack of access. Of the ecologically important hedgerows surveyed in this area, there are no surveyed hedgerows that also qualify under the historical value criteria defined in The Hedgerow Regulations (1997).

10 Pond survey

10.1 Introduction

- 10.1.1 This section of the appendix presents details of the pond surveys and relevant associated desk study data for the section of the Proposed Scheme that will pass through CFA16 to CFA22 inclusive.

10.2 Methodology

- 10.2.1 Details of the standard methodology utilised for pond surveys are provided in the Ecology technical note: Ecological field survey methods and standards (Volume5: Appendix CT-001-000/2).
- 10.2.2 No desk study records relevant to the baseline for aquatic invertebrate and aquatic plants communities of ponds requiring survey were identified.
- 10.2.3 The results of the Phase 1 habitat survey were used to identify and provide an initial description of ponds. This information was then used to screen ponds for further specialist survey against the following criteria:
- the pond holds water for four consecutive months or longer;
 - has not been heavily managed; and
 - supports a diverse or otherwise notable aquatic, emergent and marginal flora (nominally 10% cover).
- 10.2.4 The prescribed specialist survey method was dependant on the relative location of the pond meeting the above specified criteria. Ponds within the area of land required for construction of the Proposed Scheme were subject to Predictive System for Multimetrics (PSYM⁶⁷) survey. Those within 100m of this area were subject to Rapid Assessment (RA⁶⁸). National Pond Survey (NPS⁶⁹) was reserved for instances where PSYM survey was not considered to adequately describe the range of aquatic invertebrate taxa supported by the pond.
- 10.2.5 PSYM outputs provided by the Pond Conservation Trust were used to guide the assessment.

10.3 Deviations, constraints and limitations

- 10.3.1 Volume 5: Map Books – Ecology, Maps EC-11 show the location of ponds that were subject to field survey.
- 10.3.2 Screening for specialist pond survey requirements was dependant on the availability of Phase I habitat survey data and it has therefore not been possible to determine survey requirements in areas where no access is available.

⁶⁷ Pond Conservation (2002), *A guide to monitoring the ecological quality of ponds and canals using PSYM*.

⁶⁸ Pond Conservation (2010), *The development of the Big Pond Dip invertebrate survey method*.

⁶⁹ Pond Conservation (1998), Biggs, J., Fox, G., Nicolet, P., Walker, D., Whitfield, M. Williams, P. *A guide to the methods of the National Pond Survey*.

10.3.3 Table 135 identifies those ponds where the requirement for survey was identified but it has not been possible to undertake any site visits due to access constraints.

Table 135: Summary of locations where requirement for pond survey was identified but survey not undertaken due to access constraints

Ecology survey code	Pond description	Survey method proposed	CFA	Distance from the land required for construction of the Proposed Scheme ⁷⁰ (m) and NGR
Determined at survey	75m ² partially shaded pond with good water quality and 30% macrophyte cover.	PSYM	16	Within land required (SP 46135 53576)
Determined at survey	2000m ² partially shaded pond with moderate water quality and 10% macrophyte cover.	PSYM	16	Within land required (SP 41788 60041)
Determined at survey	100m ² partially shaded pond with moderate water quality and 75% macrophyte cover.	RA	18	Adjacent to land required (SP 25842 76645)
Determined at survey	336m ² partially shaded pond with moderate water quality and 70% macrophyte cover.	RA	18	Adjacent to land required (SP 26077 76859)
Determined at survey	100m ² unshaded pond with good water quality and 10% macrophyte cover.	RA	19	Adjacent to land required (SP 18208 89663)
Determined at survey	400m ² largely unshaded pond with moderate water quality and 10% macrophyte cover.	RA	22	Adjacent to land required (SK 14323 10798)
Determined at survey	200m ² largely unshaded pond with moderate water quality and 10% macrophyte cover.	RA	22	Adjacent to land required (SK 14348 10853)
Determined at survey	400m ² largely unshaded pond with moderate water quality and 30% macrophyte cover.	RA	22	Adjacent to land required (SK 12984 13425)

10.3.4 Table 136 identifies those ponds where the requirement for survey was identified after the available pond survey window and could therefore not be undertaken due to seasonal survey constraints.

Table 136: Summary of locations where requirement for pond survey was identified but survey not undertaken due to seasonal survey constraints

Ecology survey code	Pond description	Survey method proposed	CFA	Distance from the land required for construction of the Proposed Scheme (m) and NGR
Determined at survey	25m ² unshaded field pond with moderate water quality 50% macrophyte cover.	PSYM	16	Within land required – (SP 43679 57558)
Determined at survey	108m ² partially shaded woodland pond with moderate water quality and 70% macrophyte cover.	RA	16	Adjacent to land required – (SP 41377 59999)
Determined at survey	250m ² partially shaded residential (unmanaged) pond with good water quality and 40% macrophyte cover.	RA	18	Adjacent to land required (SP 33545 70335)
Determined at survey	340m ² largely unshaded pond set in amenity grassland with unmown verges, good water quality and 10% macrophyte cover.	PSYM	18	Within land required (SP 32752 71460)

⁷⁰ Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'.

Ecology survey code	Pond description	Survey method proposed	CFA	Distance from the land required for construction of the Proposed Scheme (m) and NGR
Determined at survey	2500m ² largely unshaded field pond with good water quality and 30% macrophyte cover.	RA	18	Adjacent to land required – 140m east of the Proposed Scheme route (SP 31594 73187)
Determined at survey	1200m ² largely unshaded field pond with good water quality and 20% macrophyte cover.	RA	18	Adjacent to land required (SP 31595 73226)
Determined at survey	1000m ² unshaded field pond with good water quality and 30% macrophyte cover.	RA	18	Adjacent to land required (SP 31629 73243)
Determined at survey	75m ² partially shaded pond in amenity grassland with good water quality and 50% macrophyte cover.	RA	18	Adjacent to land required (SP 31293 73258)
Determined at survey	2100m ² partially shaded pond with good water quality and 50% macrophyte cover.	RA	18	Adjacent to land required (SP 28346 75115)
Determined at survey	2025m ² unshaded pond with moderate water quality and 30% macrophyte cover.	RA	20	Adjacent to land required (SP 18973 97384)
Determined at survey	180m ² partially shaded pond with moderate water quality and 10% macrophyte cover.	RA	20	Adjacent to land required (SP 18497 97273)
Determined at survey	200m ² largely unshaded pond with moderate water quality and 40% macrophyte cover.	RA	20	Adjacent to land required (SP 18469 97296)
Determined at survey	250m ² unshaded pond with good water quality and 60% macrophyte cover.	RA	20	Adjacent to land required (SP 18192 98110)
Determined at survey	75m ² largely unshaded pond with good water quality and 20% macrophyte cover.	RA	20	Adjacent to land required (SP 18205 98047)
Determined at survey	600m ² largely unshaded residential (unmanaged) pond with moderate water quality and 20% macrophyte cover.	PSYM	21	Within land required (SK 16967 00388)
Determined at survey	1800m ² unshaded pond with moderate water quality and 10% macrophyte cover.	RA	21	Adjacent to land required (SK 15161 03900)
Determined at survey	2100m ² unshaded pond with moderate water quality and 10% macrophyte cover.	RA	21	Adjacent to land required (SK 15280 03804)
Determined at survey	55m ² largely unshaded pond with moderate water quality and 30% macrophyte cover.	RA	22	Adjacent to land required (SK 14768 09059)
Determined at survey	2000m ² partially shaded pond with moderate water quality and 20% macrophyte cover	RA	22	Adjacent to land required (SK 13627 13679)
Determined at survey	700m ² partially shaded pond with moderate water quality and 20% macrophyte cover	RA	22	Adjacent to land required (SK 13172 14029)

10.4 Baseline

10.4.1 Standing open water is identified as a habitat of principal importance identified in Section 41 of the Natural Environment and Rural Communities Act 2006⁷¹. Eutrophic

⁷¹ *Natural Environment and Rural Communities Act 2006* (Chapter 16). London. Her Majesty's Stationery Office.

standing water is a habitat of principal importance that is declining at a national level⁷².

CFA16 Ladbroke and Southam

Scoping

10.4.2 The desk study identified 20 ponds within the land required for the construction of the Proposed Scheme, and a further 27 ponds within 100m of this area.

10.4.3 Of these:

- 26 ponds could not be screened for specialist pond habitat survey requirements (due to the absence of Phase 1 habitat survey data);
- 14 ponds have been screened out of specialist pond habitat survey requirements (having not met the screening criteria);
- three ponds were identified as requiring PSYM survey but could not be surveyed due to seasonal/access constraints as described in Table 135 and Table 136;
- one pond was identified as requiring RA survey but could not be surveyed due to seasonal constraints as described in Table 136; and
- three ponds have been surveyed using PSYM having met screening requirements.

Rapid Assessment methodology

10.4.4 No RA pond surveys have been undertaken in this area.

Predicted System for Multimetrics (PSYM)

10.4.5 PSYM surveys were conducted on three ponds (Table 137).

⁷² Defra (2008), *Biodiversity Action Reporting System (BARS)*; <http://ukbars.defra.gov.uk/home/about>; Accessed January 2013.

Table 137: Summary of results for PSYM survey in CFA16

Ecology survey code (survey date)	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from the land required for construction of the Proposed Scheme ⁷³ (m) and NGR
		Number of submerged and emergent plant species	Trophic ranking score ⁷⁴ for aquatic and emergence plants	Number of uncommon ⁷⁵ plant species	Number of families and (Average score per taxon)	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
030-PS2-123001 (27 July 2012)	A small 20m ² pond with 50% emergent vegetation cover.	Five submerged and emergent plant species including common water-plantain, reed sweet-grass, soft rush, broad-leaved pondweed (<i>Potamogeton natans</i>), common reedmace and two water starwort species.	9.13	None	8 (3.89)	0	3	PSYM Index of Biological Integrity – 44% PSYM quality category – Poor	CFA16	Within land required (SP 42340 59627)
030-PS2-125001 (26 July 2012)	A medium sized pond (350m ²) with 80% emergent vegetation cover.	Six submerged and emergent plant species including common water-plantain, yellow flag, branched bur-reed and common reed.	8.46	Two: namely, the nationally scarce ⁷⁶ water soldier (<i>Stratiotes aloides</i>) and the local ⁷⁷ fat duckweed (<i>Lemna gibba</i>).	15 (4.67)	3	2	PSYM Index of Biological Integrity – 78% PSYM quality category – Good	CFA16	Within land required (SP 41010 60867)

⁷³ Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'.

⁷⁴ In Pond Conservation (2002), A guide to monitoring the ecological quality of ponds and canals using PSYM. The Trophic Ranking Score system for PSYM is adapted from Palmer, M.A. (1989). A botanical classification of standing waters in Great Britain. *Research & survey in nature conservation*, 10. Nature Conservancy Council, Peterborough.

⁷⁵ In Pond Conservation (2002), A guide to monitoring the ecological quality of ponds and canals using PSYM. 'Uncommon species are those which can be described as 'local', 'nationally scarce' or Red Data Book'.

⁷⁶ In Pond Conservation (2002), A guide to monitoring the ecological quality of ponds and canals using PSYM. 'Nationally Scarce: species recorded from 15-100 grid squares in Britain'.

⁷⁷ In Pond Conservation (2002), A guide to monitoring the ecological quality of ponds and canals using PSYM. 'Local: species recorded from between 101 and 700 grid squares in Britain'.

Ecology survey code (survey date)	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from the land required for construction of the Proposed Scheme ⁷³ (m) and NGR
		Number of submerged and emergent plant species	Trophic ranking score ⁷⁴ for aquatic and emergence plants	Number of uncommon ⁷⁵ plant species	Number of families and (Average score per taxon)	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
030-PS2-127001 (04 June 2013)	A large pond (3700m ²) with 10% emergent vegetation cover.	Eleven submerged and emergent plant species including common spikerush (<i>Eleocharis palustris</i>), gypsywort (<i>Lycopus europaeus</i>), branched bur-reed and Nuttall's pondweed.	9.08	Two: namely, the local ⁷⁷ sea clubrush (<i>Bolboschoenus maritimes</i>) and yellow water-lilly.	22 (4.86)	2	3	PSYM Index of Biological Integrity – 67% PSYM quality category – Moderate	CFA16	Within land required (SP 39563 62321)

National Pond Survey (NPS)

- 10.4.6 None of the ponds that are likely to be significantly affected by the Proposed Scheme (i.e. those for which PSYM survey was undertaken) have been taken forward for NPS survey, due the fact they are adequately described by PSYM survey for the purpose of assessment. Although a single PSYM pond survey in this area resulted in a quality category of 'Good', this is due to macrophyte species already adequately described the PSYM methodology.

Discussion

- 10.4.7 None of the ponds surveyed are considered to meet the Warwickshire LWS selection criteria⁷⁸.
- 10.4.8 Pond 030-PS-123001 was found to support macrophyte and macro-invertebrate communities of relatively low taxon richness, with only commonly occurring species recorded. The calculated PSYM quality category for the pond is poor.
- 10.4.9 The calculated PSYM quality category for the pond 030-PS2-125001 is good on account of the presence of the near threatened/nationally scarce water soldier. The calculated PSYM quality category for the pond 030-PS2-127001 is moderate on account of a taxon rich macro-invertebrate assemblage (including twenty-two families) indicative of very good water quality, and a macrophyte assemblage including two uncommon species.

CFA17 Offchurch and Cubbington

Scoping

- 10.4.10 The desk study has identified three ponds within the area of land required for the construction of the Proposed Scheme, and a further 15 ponds within 100m of this area.
- 10.4.11 Of these:
- 14 ponds could not be screened for specialist pond habitat survey requirements (due to the absence of Phase 1 habitat survey data); and
 - 4 ponds have been screened out of specialist pond habitat survey requirements (having not met the screening criteria).

CFA18 Stoneleigh, Kenilworth and Burton Green

Scoping

- 10.4.12 The desk study identified 14 ponds within the area of land required for the construction of the Proposed Scheme, and a further 65 ponds within 100m of this area.
- 10.4.13 Of these:
- 16 ponds were unable to be screened for specialist pond habitat survey requirements due to the absence of Phase 1 habitat survey data to inform this process;

⁷⁸ Guidance for the selection of non-statutory SINC in Warwickshire (Warwickshire Wildlife Sites Project, 1998).

- 46 ponds were screened out of specialist pond habitat survey requirements having not met the screening criteria;
- eight ponds were identified as requiring RA survey but could not be surveyed due to seasonal/access constraints as described in Table 135 and Table 136;
- one pond was identified as requiring PSYM survey but could not be surveyed due to seasonal constraints as described in Table 136; and
- five ponds have been surveyed using the PSYM method and three using RA method having met screening requirements.

Rapid Assessment methodology

10.4.14 RA surveys were conducted on three ponds (Table 138).

Table 138: Summary of rapid assessment methodology survey results for CFA18

Ecology survey code (survey date)	Pond description	Number of aquatic macro-invertebrate groups identified	Rapid assessment methodology quality band	CFA	Distance from the land required for construction of the Proposed Scheme ⁷⁹ (m) and orientation (NGR)
030-PS1-137001 (03 August 2012)	Pond in field corner containing reeds, rushes and lilies. Water beetles and true bugs recorded at survey.	6	RA score = 18 (moderate)	CFA18	Adjacent to land required (SP 33561 70403)
030-PS1-139001 (03 August 2012)	A lined pond with little substrate and no vegetation in water. Pond skaters, mayfly larvae and worms/leaches/fly larvae recorded. RA score of 11 indicates poor quality pond.	3	RA score = 11 (poor)	CFA18	Adjacent to land required (SP32467 72035)
030-PS1-140001 (04 June 2012)	Naturalised shallow garden pond with abundant emergent macrophytes. Caddis and damselfly larvae recorded. Rapid Assessment score of 43 indicates good quality pond.	9	RA score = 43 (good)	CFA18	Adjacent to land required (SP31601 73010)

Predicted System for Multimetrics (PSYM)

10.4.15 PSYM surveys were conducted on five ponds (Table 138).

⁷⁹ Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'.

Table 139: Summary of results for PSYM survey in CFA18

Ecology survey code (survey date)	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from the land required for construction of the Proposed Scheme ⁸⁰ (m) and NGR
		Number of submerged and emergent plant species	Trophic ranking score ⁷⁴ for aquatic and emergence plants	Number of uncommon ⁷⁵ plant species	Number of families and (Average score per taxon)	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
030-PS2-138001 (03/08/12)	A large (2000m ²) pond with 30% emergent vegetation cover.	Six submerged and emergent plant species reed sweet-grass, hard rush, Canadian pondweed (<i>Elodea canadensis</i>) broad-leaved pondweed and common reedmace.	8.88	One: namely the local ⁷⁷ lesser reedmace (<i>Typha angustifolia</i>).	17 (5.06)	1	2	PSYM Index of Biological Integrity – 56% PSYM quality category – Moderate	CFA18	Adjacent to land required (SP 33073 70944)
030-PS2-140002 (08/08/12)	A 200m ² pond with 15% emergent vegetation cover.	Four emergent species were recorded, water plantain, yellow iris, soft rush and branched bur-reed.	8.83	One: namely the local ⁷⁷ fat duckweed.	9 (3.78)	1	1	PSYM Index of Biological Integrity – 33% PSYM quality category – Poor	CFA18	Within land required (SP 31738 72813)
030-PS2-141001 (17/07/13)	A 100m ² pond with 20% emergent vegetation.	Seven emergent species recorded including water plantain, reed sweet-grass, soft rush and reed canary-grass.	9.3	None	6 (3.67)	0	2	PSYM Index of Biological Integrity – 33% PSYM quality category – Poor	CFA18	Within land required (SP 30746 73429)

⁸⁰ Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'.

Ecology survey code (survey date)	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from the land required for construction of the Proposed Scheme ⁸⁰ (m) and NGR
		Number of submerged and emergent plant species	Trophic ranking score ⁷⁴ for aquatic and emergence plants	Number of uncommon ⁷⁵ plant species	Number of families and (Average score per taxon)	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
030-PS2-14100 (17/07/12)	A large (650m ²) pond with only 2% emergent vegetation cover.	Seven emergent species recorded: water plantain, bulbous rush (<i>Juncus bulbosus</i>), soft rush, marsh dock (<i>Rumex palustris</i>), water figwort (<i>Scrophularia auriculata</i>), great willowherb and gypsywort.	7.77	One: namely the local ⁷⁷ marsh dock.	10 (3.90)	0	2	PSYM Index of Biological Integrity – 44% PSYM quality category – Poor	CFA18	Adjacent to land required (SP 30924 73819)
030-PS2-142001 (17/07/12)	A 300m ² pond with 15% emergent vegetation cover.	Seven submerged and emergent species recorded including, water plantain, soft rush, broad-leaved pondweed, branched bur-reed and Nuttall's pondweed.	8.97	None	14 (3.93)	0	3	PSYM Index of Biological Integrity – 39% PSYM quality category – Poor	CFA18	Adjacent to land required (SP 30697 73925)

National Pond Survey (NPS)

- 10.4.16 None of the ponds that are likely to be significantly affected by the Proposed Scheme (i.e. those for which PSYM survey was undertaken) have been taken forward for NPS survey, due the fact they are adequately described by the PSYM methodology for the purpose of assessment. No pond surveyed using the PSYM methodology was found to be of sufficient quality to justify further analysis under the NPS survey method. All ponds surveyed using the PSYM methodology were found to be of moderate quality, or less. Aquatic macro-invertebrate group metrics which act as a quality measures e.g. number of dragonfly and beetle families, were in all instances low.

Discussion

- 10.4.17 No pond surveyed meets the Warwickshire LWS selection criteria. With the exception of pond 030-PS2-138001, ponds surveyed were found to support communities of low taxon richness, with only commonly occurring macrophyte species recorded (e.g. common reedmace and soft rush).
- 10.4.18 Pond 030-PS2-138001 was found to support greater macro-invertebrate taxon richness than other ponds surveyed, and a community indicative of good biological water quality. The calculated PSYM quality category for the pond is moderate.
- 10.4.19 A number of ponds were screened out of requirement for habitat survey based on survey scoping criteria. However these are still likely to provide valuable habitats for aquatic species.

CFA19 Coleshill Junction

Scoping

- 10.4.20 Desk study has identified 33 ponds within the area of land required for the construction of the Proposed Scheme, and a further 21 ponds within 100m of this area.
- 10.4.21 Of these:
- eight ponds were unable to be screened for specialist pond habitat survey requirements (due to the absence of Phase 1 habitat survey data);
 - 45 ponds have been screened out of specialist pond habitat survey requirements (having not met the screening criteria); and
 - One pond was identified as requiring RA survey but could not be surveyed due to access constraints as described in Table 135.

Rapid Assessment methodology

- 10.4.22 No pond surveys have been undertaken in this area.

Predicted System for Multimetrics (PSYM)

- 10.4.23 No pond surveys have been undertaken in this area.

National Pond Survey (NPS)

- 10.4.24 No pond surveys have been undertaken in this area.

Discussion

- 10.4.25 The majority of ponds in this area were screened out of requirement for habitat survey based on survey scoping criteria. However these are still likely to provide valuable habitats for aquatic species.

CFA20 Curdworth to Middleton*Scoping*

- 10.4.26 The desk study has identified 15 ponds within the land required for the construction of the Proposed Scheme, and a further 29 ponds within 100m of this area.
- 10.4.27 Of these:
- 20 ponds were unable to be screened for specialist pond habitat survey requirements (due to the absence of Phase 1 habitat survey data);
 - 16 ponds have been screened out of specialist pond habitat survey requirements (having not meet the screening criteria);
 - four ponds have been surveyed using PSYM having met screening requirements; and
 - four ponds were identified as meeting screening requirements for RA but could not be surveyed due to seasonal survey constraints as described in Table 136.

Rapid Assessment methodology

- 10.4.28 No RA pond surveys have been undertaken in this area.

Predicted System for Multimetrics (PSYM)

- 10.4.29 Predicted System for Multimetrics surveys were conducted on four ponds (Table 140).

Table 14o: Summary of results for PSYM surveys in CFA2o

Ecology survey code (survey date)	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from the land required for construction of the Proposed Scheme ⁸¹ (m) and orientation (NGR)
		Number of submerged and emergent plant species	Trophic ranking score ⁷⁴ for aquatic and emergence plants	Number of uncommon ⁷⁵ plant species	Number of families and (Average score per taxon)	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
030-PS2-167001 (08 August 2012)	A very large (3600m ²) pond with 5% emergent vegetation cover.	Four submerged and emergent plant species including water plantain, yellow-flag iris, soft rush and common reedmace.	8.07	One: namely the local ⁷⁷ white water-lily (<i>Nymphaea alba</i>).	2 (3.5)	0	0	PSYM Index of Biological Integrity – 17% PSYM quality category – Very poor	CFA2o	Within land required (SP 19319 93993)
030-PS2-168001 (20 August 2012)	A small (125m ²) pond with 15% emergent vegetation cover.	One emergent plant species recorded, namely, common reedmace.	8.75	None	12 (3.92)	1	1	PSYM Index of Biological Integrity – 33% PSYM quality category – Poor	CFA2o	Within land required (SP 19162 94906)
030-PS2-168002 (20 August 2012)	A large (1200m ²) pond with 10% emergent vegetation cover.	Five submerged and emergent plant species recorded, including, soft rush, water horsetail (<i>Equisetum fluviatile</i>), marsh horsetail (<i>Equisetum palustre</i>), common reedmace and the alien invasive Nuttall's pondweed.	9.17	None	14 (3.93)	1	3	PSYM Index of Biological Integrity – 44% PSYM quality category – Poor	CFA2o	Within land required (SP19168 94871)

⁸¹ Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'.

Ecology survey code (survey date)	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from the land required for construction of the Proposed Scheme ⁸¹ (m) and orientation (NGR)
		Number of submerged and emergent plant species	Trophic ranking score ⁷⁴ for aquatic and emergence plants	Number of uncommon ⁷⁵ plant species	Number of families and (Average score per taxon)	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
030-PS2-170001 (05 June 2013)	A very large (2400m ²) pond with 2% emergent vegetation cover.	Seven emergent plant species recorded, including, cover including great willowherb, soft rush, gypsywort, celery-leaved buttercup (<i>Ranunculus sceleratus</i>), water-cress, bittersweet nightshade (<i>Solanum dulcamara</i>) and common reedmace.	9.50	None	5 (4.17)	0	3	PSYM Index of Biological Integrity – 39% PSYM quality category – Poor	CFA20	Within land required (SP 18913 97637)

National Pond Survey (NPS)

- 10.4.30 None of the ponds that are likely to be significantly affected by the Proposed Scheme (i.e. those for which PSYM survey was undertaken) have been taken forward for NPS survey, due the fact they are adequately described by the PSYM methodology for the purpose of assessment. No pond surveyed using the PSYM methodology was found to be of sufficient quality to justify further analysis under the NPS survey method. All ponds surveyed were found to be of poor quality, or less. Aquatic invertebrate group metrics which act as a quality measures e.g. number of dragonfly and beetle families, were in all instances low.

Discussion

- 10.4.31 In the absence of field data, it is considered unlikely that any of the small ponds within the land required for the construction of the Proposed Scheme will meet the Warwickshire LWS selection criteria.
- 10.4.32 Pond 030-PS2-167001 was found to support a limited range of commonly occurring macrophytes, and a very species poor macro-invertebrate assemblage indicative of low biological water quality. The calculated PSYM quality category for the pond is very poor.
- 10.4.33 Ponds 030-PS2-170001, 030-PS2-168001, and 030-PS2-168002 were all found to support a limited range of commonly occurring macrophytes. Their macro-invertebrate assemblages were indicative of moderate to low biological water quality and the calculated PSYM quality category for the ponds is poor.

CFA21 Drayton Bassett, Hints and Weeford

Scoping

- 10.4.34 The desk study identified 22 ponds within the area of land required for the construction of the Proposed Scheme and a further 18 ponds within 100m of this area.
- 10.4.35 Of these:
- 10 ponds were unable to be screened for specialist pond habitat survey requirements (due to the absence of Phase 1 habitat survey data);
 - 24 ponds have been screened out of specialist pond habitat survey requirements (having not meet the screening criteria);
 - two ponds were identified as requiring RA survey but could not be surveyed due to seasonal constraints as described in Table 136;
 - one pond was identified as requiring PSYM survey but could not be surveyed due seasonal constraints as described in Table 136; and
 - three ponds have received PSYM survey having met screening requirements.

Rapid Assessment methodology

- 10.4.36 No RA pond surveys have been undertaken in this area.

Predicted System for Multimetrics (PSYM)

- 10.4.37 PSYM surveys were conducted on three ponds (Table 141).

Table 141: Summary of results for PSYM surveys in CFA21

Ecology survey code (survey date)	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from the land required for construction of the Proposed Scheme ⁸² (m) and orientation (NGR)
		Number of submerged and emergent plant species	Trophic ranking score ⁷⁴ for aquatic and emergence plants	Number of uncommon ⁷⁵ plant species	Number of families and (Average score per taxon)	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
030-PS2-172001 (10 August 2012)	A large (300m ²) partially shaded pond with 70% emergent macrophyte cover.	Only two commonly occurring macrophyte species were recorded, including soft rush and common reedmace.	8.5	None	7 (3.3)	None	2	PSYM Index of Biological Integrity – 33% PSYM quality category – Poor	CFA21	Within land required (SP 17789 99228)
030-PS2-174001 (5 June 2013)	A large (870m ²) partially shaded pond with 20% emergent macrophyte cover.	Seven commonly occurring macrophyte species were recorded, including the marginal and emergent greater pond sedge (<i>Carex riparia</i>), great willowherb, soft rush, woody nightshade and common reedmace, the floating-leaved amphibious bistort and broad-leaved pondweed, as well as the submerged curled pondweed and fennel pondweed.	9.58	None	12 (3.9)	1	3	PSYM Index of Biological Integrity – 44% PSYM quality category – Poor	CFA21	Within land required (SK 16835 00698)

⁸² Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'.

Ecology survey code (survey date)	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from the land required for construction of the Proposed Scheme ⁸² (m) and orientation (NGR)
		Number of submerged and emergent plant species	Trophic ranking score ⁷⁴ for aquatic and emergence plants	Number of uncommon ⁷⁵ plant species	Number of families and (Average score per taxon)	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
030-PS2-176001 (9 August 2012)	A very large (5000m ²) partially shaded pond with 5% emergent macrophyte cover.	Five commonly occurring macrophyte species were recorded, including the emergent lesser pond sedge, yellow-flag iris, soft rush and water figwort, in addition to the alien invasive Himalayan balsam.	9.50	Two: namely the local ⁷⁷ species bulrush and stonewort (Chara sp.).	22 (4.5)	2	3	PSYM Index of Biological Integrity – 72% PSYM quality category – Moderate	CFA21	Within land required (SK 15531 02865)

National Pond Survey (NPS)

- 10.4.38 None of the ponds that are likely to be significantly affected by the Proposed Scheme (i.e. those for which PSYM survey was undertaken) have been taken forward for NPS survey, due the fact they are adequately described by the PSYM methodology for the purpose of assessment. No pond surveyed using the PSYM methodology was found to be of sufficient quality to justify further analysis under the NPS survey method.

Discussion

- 10.4.39 In the absence of field data, it is considered unlikely that any of the small ponds within the land required for the construction of the Proposed Scheme will meet the Staffordshire LWS selection criteria.
- 10.4.40 No pond surveyed meets the Staffordshire LWS selection criteria. However, but for the presence of the alien invasive Himalayan balsam, pond 030-PS2-176001 will meet the criteria for designation as a BAS under the selection criteria. The calculated PSYM quality category for the pond is moderate. The pond supports a taxon rich aquatic invertebrate assemblage, indicative of good water quality, in addition to two local macrophyte species (i.e. species of restricted distribution). The calculated PSYM quality category for the pond is moderate.
- 10.4.41 Ponds 030-PS2-172001 and 030-PS2-174001 were found to support only communities of low taxon richness, with only commonly occurring macrophyte species recorded (e.g. common reedmace and soft rush). The calculated PSYM quality category for the ponds is poor.

CFA22 Whittington to Handsacre

Scoping

- 10.4.42 The desk study has identified 24 ponds within the area of land required for the construction of the Proposed Scheme, and a further 33 ponds within 100m of this area. Of these:
- 25 ponds were unable to be screened for specialist pond habitat survey requirements (due to the absence of Phase 1 habitat survey data);
 - 24 ponds have been screened out of specialist pond habitat survey requirements (having not met the screening criteria);
 - two ponds have received PSYM survey having met screening requirements; and
 - six ponds has been identified as requiring RA survey having met screening requirements, but could not be surveyed due to seasonal/access constraints as described in Table 135 and Table 136.

Rapid Assessment (RA) methodology

- 10.4.43 No RA pond surveys have been undertaken in this area.

Predicted System for Multimetrics (PSYM)

- 10.4.44 PSYM surveys were conducted on two ponds (Table 142).

Table 142: Summary of results for PSYM surveys in CFA22

Ecology survey code (survey date)	Pond description	Plants			Invertebrates			General Quality Assessment (GQA)	CFA	Distance from the land required for construction of the Proposed Scheme ⁸³ (m) and orientation (NGR)
		Number of submerged and emergent plant species	Trophic ranking score ⁷⁴ for aquatic and emergence plants	Number of uncommon ⁷⁵ plant species	Number of families and (Average score per taxon)	Number of dragonfly (Odonata) and alderfly (Megaloptera) families	Number of beetle families			
030-PS2-186001 (09 August 2012)	A large (4500m ²) pond with limited emergent vegetation (2% cover).	A total of three commonly occurring marginal plant species were recorded, namely, yellow iris, soft rush and hard rush.	N/A	None	8 (3.1)	None	None	PSYM Index of Biological Integrity – 6% PSYM quality category – Very Poor	CFA22	Within land required (SK 14272 11728)
030-PS2-190001 (05 June 2013)	A small (360m ²) pond with limited emergent vegetation (1% cover).	Four common marginal and submerged plant species were recorded, namely, water starwort, bittersweet, soft rush and the invasive plant species Himalayan balsam.	None	None	11 (3.5)	None	None	PSYM Index of Biological Integrity – 17% PSYM quality category – Very Poor	CFA22	Within land required (SK 10847 14093)

⁸³ Hereafter the term 'land required' is used as a shortened version of the full term 'land required for the construction of the Proposed Scheme'.

National Pond Survey (NPS)

- 10.4.45 None of the ponds that are likely to be significantly affected by the Proposed Scheme (i.e. those for which PSYM survey was undertaken) have been taken forward for NPS survey, due the fact they are adequately described by the PSYM methodology for the purpose of assessment. No pond surveyed using the PSYM methodology was found to be of sufficient quality to justify further analysis under the NPS survey method.

Discussion

- 10.4.46 In the absence of field data, it is considered unlikely that any of the small ponds within the area of land required for the construction of the Proposed Scheme will meet the Staffordshire LWS selection criteria.
- 10.4.47 Both ponds surveyed in this area display a limited range of flora and fauna indicative of poor water quality.